Co-production of Innovation Behaviour: The Role of Innovation Competency in HEIs

A thesis submitted for the degree of Doctor of Philosophy

by

Ammar Abdulla Al Hawaj

Brunel Business School

College of Business, Arts and Social Sciences

Brunel University London, United Kingdom

2023

Dedication

To my parents.

Acknowledgement

Cognitio, sapientia, humanitas.

"*There is only one good, knowledge, and one evil, ignorance.*" The words of Socrates resonate throughout one's PhD journey. This journey has been transformational and beautiful – even throughout the ugly. The words of Socrates will continue to hold meaning to those that seek to better themselves and the human condition through the pursuit of knowledge, both new and extant: A pursuit that epitomises the journey which only truly begins with the attainment of the designation and title of Doctor.

First and foremost, I would like to acknowledge and thank my mentor, my role model, and true source of inspiration for whom no words can do justice; my father, Professor Abdulla Al Hawaj. Without your love, guidance, support, motivation, patience and impatience, I would not have been able to achieve my goal. I would also like to acknowledge and thank my mother, for her love, patience, motivation, and support, especially during and throughout the many late nights that crept into the early hours of morning. I do not take your unconditional love and support for granted. I am grateful and forever indebted to you: My parents.

I would like to express my deep and sincere gratitude to my principal supervisor, Dr. Bidit Dey, for his guidance, feedback, patience, and encouragement which truly enriched my PhD journey at every stage. Thank you, Dr. Bidit, for standing by me, and supporting me, in achieving this important career milestone. I also thank Dr. Wafi Al-Karaghouli and the rest of my supervisory team, Prof. Allam Hamdan and Dr. Thaira Al Shirawi, for their advice and positivity.

Finally, I would be truly remiss without acknowledging and thanking Ahlia University for the support that has been critical towards the completion of my thesis to obtain this degree. Concomitantly, I must acknowledge the truly supportive PhD administrative team, Ms. Hessa Aldhaen and Mr. Gowrishankar Srinivasan, for their assistance throughout.

Arduus ad solem.

Abstract

This research was conducted in the field of value co-creation; a topic that is new and rapidly gaining the attention of researchers and practitioners alike. The main aim was to develop a theoretical model that could demonstrate value co-creation in a classroom setting in a higher education context, with a focus on innovation. The focus of study was the individual innovation behaviour of students in a classroom setting in a higher education context, and the factors involved therein. Furthermore, the outcome of such individual innovation behaviour, as exhibited by students, was examined.

A mixed method study was undertaken given that the research questions revolved around the two vital terms, namely, 'what' and 'how'. A private higher education institution was chosen for conducting the study. Over 900 undergraduate students were enrolled at that institution at the time of conducting the study. The census method was used as part of the research strategy in the quantitative data collection phase, while purposive sampling was used with regard to the semi-structured interviews which were conducted as part of the qualitative data phase of the study. Quantitative data analysis, using structural equation modelling, showed that co-production was confirmed as a determinant of individual innovation behaviour and student benefits in the classroom setting. Undergraduate students, regardless of the programme in which they were enrolled, were found to participate in the value co-creation process. Innovation competency was found to intervene in the relationship between co-production and student benefits; by acting on the individual innovation behaviour of students. Value-in-use was found as a determined factor, while the combined effect of co-production and innovation competency factors was found to exert an effect on individual innovation behaviour, value-in-use, and student benefits. Four out of eight postulated hypotheses were supported.

The data analysis of the qualitative data phase was conducted using thematic analysis. This yielded new factors that were not conceptualised in the theoretical framework. The new factors could potentially act as variables. The findings of the qualitative study supported the postulated hypotheses. However, the rejection of two of the hypotheses concerning the relationship between the personal and networking dimensions on the one hand, and individual innovation behaviour on the other, could not be explained. This was compared with the results of the qualitative study, which found the rejections inconsistent with published outcomes in the relevant literature. Accordingly, further investigations have been suggested.

Finally, the research outcomes make significant contributions to knowledge, theory, policy, and practice. These have been highlighted in the final chapter of this thesis. Four concepts, published in seminal works, have been challenged. Solutions are suggested to overcome the flaws in the conceptualisations. The

research outcomes provide evidence to suggest that value co-creation occurs in the classroom setting in a higher education context. Additionally, the outcomes confirm three factors that affect the value co-creation process and explain how those factors affect the innovation behaviour of students and the benefits derived thereof.

Table of Contents

List of Tables

List of Figures

List of Abbreviations

AVE	Average Variance Extracted
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CMIN (λ2)	Chi-squared Goodness of Fit Test
CMIN/df	Normal Chi-squared Test
COPROD	Co-production
C.R.	Critical Ratio
DART	Dialogue Access Risk Assessment Transparency
DF	Degrees of Freedom
FINCODA	Framework for Innovation Competencies Development and Assessment
FP	Foundational Premise
GFI	Goodness Fit Index
G-D	Goods Dominant
HEI	Higher Education Institution
ID	Interpersonal Dimension
IFI	Increment Fit Index
IIB	Individual Innovation Behaviour
INCODE	Innovation Competencies Development (Project)
IPR	Intellectual Property Rights
ML	Maximum Likelihood
ND	Networking Dimension
NESTA	National Endowment for Science, Technology and the Arts
NFI	Normed Fit Index
NSERC	Natural Sciences and Engineering Research Council of Canada
PD	Personal Dimension
RMR	Root Mean Square Residual
RMSEA	Root Mean Square Error Approximation
SB	Student Benefit
SDT	Self-Determination Theory
SEM	Structural Equation Modelling
SMC	Squared Multiple Correlation
SPSS	Statistical Package for Social Sciences
S-D	Service Dominant
TLI	Tucker-Lewis Index
VIU	Value-in-use

Chapter 1 - Introduction

1.1 Chapter Introduction

Value co-creation is a new phenomenon that is gathering momentum across educational institutions (Osorno-Hinojosa et al., 2022). However, this concept remains new and opaque to those institutions (Nguyen et al., 2021). Although the concept promises to revolutionise the way by which education institutions are being run, nevertheless, the paucity of studies in this field in the context of higher education has been identified as a serious gap that begs the attention of researchers (Dean et al., 2016). While more and more research outcomes are being published in this area, yet certain important concepts including value co-creation, value-in-use, value co-production, co-creation experience, innovation experience, innovation behaviour, innovation competency, and student benefits remain understudied (Prahalad and Ramaswamy, 2003; Vargo and Lusch, 2004; Leem 2021; Nguyen, 2021). This is particularly true in the context of higher education institutions (HEIs), where this gap is glaring. The lack of knowledge in this area represents a serious handicap to those institutions in the face of the changing higher education landscape and the rise of online degrees in the post-pandemic era.

In a world being swept by the winds of globalisation, where these winds may ebb and flow, blowing in their path a wave of turbulent innovation fueled by disruptive technologies, companies find themselves navigating the ever so high seas that carry in their wake a cornucopia of opportunities and threats. Just as the captains of yore turned their gaze to the skies, observing the stars, drawing, constructing and de-constructing constellations that would guide them, so must companies today look towards their customers, not just as consumers, individuals, groups, or even as a collective, but with a fresh transcending view of their roles and relationships. Customer roles, relationships, interactions, and engagement with other customers, whether on a one-to-one basis, or many-to-many, with the firm, and other stakeholders and actors, must too be observed and analysed with a view of understanding the dense networks, constellations of interactions and information flows, in which deep insights can be garnered and co-creation processes and conditions can be fostered (Vargo and Lusch, 2008).

As companies face new threats from competition, economic down cycles, credit crunches, and sustainability challenges which manifest in a myriad of ways including pressures from all stakeholders to sustain innovation, new product development and profits; the CEOs, management teams, and marketing departments are challenged to find new ways of doing business. 'Business as usual' is no longer enough. Within this context, it is widely believed that large companies are particularly vulnerable to innovation

sustainability issues, as young start-ups are proliferating and introducing disruptive technologies that can amount to existential threats to the large, old, and established companies (Viki, 2018). Companies like Airbnb, Uber, and Netflix have severely disrupted their industries. Old giants like Polaroid and Kodak have disappeared. Yet another category of old giants, such as Xerox, and Blackberry, are only fringe players in today's market; a far cry from the days in which they dominated their respective industries. Such tumultuous turbulence in the market, and the dramatic changes in the fortunes of (once) major companies, is not exclusive to or phenomenological of the tech industry. However, technological disruption and a lack of innovation are often the common denominator.

There is a growing body of scientific literature that is organised around co-creation (Galvagno and Dalli, 2014). The literature is replete with the term co-creation, which is being increasingly used and deployed in various ways across many fields and disciplines. The concept of co-creation is organising into a new paradigm in the management literature. The term can be defined in different ways; however, it invariably refers to business practice that is characterised by multi-stakeholder engagement (Jones, 2018). The changing roles of customers today, concomitant with the advent of web 2.0 technologies, has served to supplant many of the traditionally accepted notions in both business practice and the service marketing literature (Prahalad and Ramaswamy, 2000). The boundaries of the firm have been blurred. The dichotomy of goods and services has been challenged (Vargo and Lusch, 2004). The value chain has been stretched and reconfigured to encompass new actors. All these conceptual and practical developments have worked in tandem to usher in a new and evolving logic; namely, the service-dominant logic (S-D logic). Although service-dominant logic offers a new lens with which value co-creation can be understood and applied; operationalisation and application are still found to be lacklustre. The promise of new ways to achieve competitive advantage for firms is an attractive one. However, further studies integrating and applying new theories are needed to address the limitations of the service-dominant logic theory. The implications of such are far reaching, and of particular significance in the context of higher education where the customer is typically engaged in various ways as the central focus of the service delivery over an extended period of time. However, academics are still reluctant to involve and empower students in certain domains and practice, beyond student voice and narrow representation on committees, despite the many promises that value co-creation brings (Matthews, 2018; Woods and Homer, 2021). This, in part, can be attributed to the commonplace perceptions, held by academics, wherein any added-value and benefits that may accrue out of such are perceived as essentially representing a Faustian bargain within the context of HEIs. As such, the higher education sector presents a particularly interesting case for the investigation of value co-creation processes through the study of interactions and myriad touch points that exist in order to optimise co-creation processes. At the most fundamental level of interaction is the faculty-student dyad.

1.2 Background of the Study

The pursuit of new avenues for achieving competitive advantage in the higher education sector is becoming ever more important. Universities are searching for new ways to innovate and teach innovation. In fact, HEIs today are faced with a plethora of challenges. One third of universities in England are faced with deficits (Jenkins, 2023). This is a trend that holds true in many other countries, including the United States, where the overall California State University (Zineshteyn, 2023) and the State University of New York systems are facing deficits (Gramza, 2022). Similarly, a majority of the University of Wisconsin system universities recorded deficits last year, and many other such examples are abound, for instance, both Depaul University and West Virginia University are facing their own acute deficits, each amounting to an estimated $56m and $35m respectively for the year 2023/24 (Nietzel, 2023). The situation is even more dire in Australia and New Zealand, wherein a majority of public universities in both countries have recorded deficits in 2022. Beyond the serious challenges caused by budget deficits, universities face questions with regard to their value vis-à-vis the university degrees offered and their worth (Saurbier, 2020). In fact, such questions surrounding the true value of the academic provision and related offerings have amounted to legal challenges in some jurisdictions, wherein an estimated 100,000 students from 100 different UK HEIs have tried to sue their universities following the COVID-19 pandemic disruptions (Porter, 2023). This presents yet another example of how stakeholders are increasingly questioning the value of a university degree. Universities are faced with an unprecedented attack on their value, role, and true purpose. Universities need to urgently revisit their value propositions, to redefine their roles and find new ways to create/co-create value for both students as the main beneficiaries, and society as a whole (Dollinger, 2018; Matthews et al., 2018).

1.3 Motivation for this Research

As previously mentioned, the challenges in the higher education sector are many. Whether its US-based HEIs which are seeing a crisis of confidence in the value of their degree offerings (Belkin, 2023), owing to the high and still rising tuition fees, or the debt saddled governments in other parts of the world (UNCTAD, 2023) which are struggling to maintain their education funding models, the question of value for money is becoming a serious issue that universities the world over must contend with like never before. Other challenges include student mobility issues, increasing competition (Pinna et al., 2023), a lack of innovation (Binkley et al., 2012), and an increase in demand for new skills (Badawi and Dragoicea, 2023). Universities are expected to produce graduates with a multitude of skills which include resilience, analytical thinking and innovation, active learning, creativity and ideation, complex problem solving, and technology-based skills (World Economic Forum, 2020). Such skills and competencies are crucial in order for graduates to

cope with digital transformation and the advent of the 4th industrial revolution. Such challenges require a new type of thinking and innovative solutions.

Further complicating the challenge-ridden higher education landscape is the problem of slower rate of growth, or worse decline, in student intake and enrolment figures which an increasing number of HEIs are found to be facing (Voll, 2023; Badawi and Dragoicea, 2023). For instance, Badawi and Dragoicea (2023) claim that only 40% of youth in Europe have a higher education qualification. In Italy, that figure drops down to only 29.9% of youth who possess post-secondary degree. Furthermore, universities in Italy continued to see a decline in student numbers in 2022, during which university student enrollment statistics registered a reduction of 2.8%. As for the Arab Gulf region comprising six nations, available statistics indicate that the tertiary education grew at a compound annual growth rate (CAGR) of only 1.0% during the period 2016-2021 (Voll, 2023). The statistics show that growth is declining in some countries, while stagnating altogether in others. As such, student retention becomes ever more important and pressing. These trends need to be urgently addressed.

Value co-creation brings promises to reverse the negative student enrollment trends (Badawi and Dragoicea, 2023; Pinna et al., 2023). In providing an innovative education that can train students to develop new skills, prepare them for a world of technological disruption, and allow them to take responsibility for their own value creation, HEIs can start laying the foundations, and fostering the conditions, for a new and emerging model of higher education. Transforming the model of education by way of a transition from a traditional method of teaching-learning to a new modality that focuses on further engaging learners in higher levels of collaboration is a challenging endeavor (Pinna et al., 2023). Yu et al. (2018) argue that interactions between organisations (e.g. universities) and customers (e.g. students) can both create and enhance the value of the service (e.g. education) being provided by those organisations, an argument supported by the service-marketing discipline. Value co-creation can be fostered through the creation of learning communities and offering competency-based education. A new generation of learners is necessary, where such learners collaborate with various stakeholders, including the university itself, to enhance the quality of service. Universities can begin to innovate by teaching students how to innovate. The pedagogical approaches used in smart learning environments need to be studied (Tabuenca et al., 2021) to gain knowledge on how learning communities can offer innovative education and training opportunities for skills building and development.

When students are conceived as customers, their roles can change and expand, where they themselves become resources. Their feedback and suggestions become knowledge that can be exploited. This can help

to enhance the image of the institution in which they study. Thus, by focusing on collaborating with the students in the learning process, co-creation can occur, producing mutually beneficial outcomes. Students can learn new skills that are necessary to access the job market, while universities can enhance their quality of service and image towards attracting more students. In the same vein, Spohrer (2021) argues that each time knowledge is integrated into a learning service and learner experiences, this helps those learners to gain new skills, where knowledge acts as a resource and evolves through the collaboration and engagement activities. There is a need to know how to overcome the challenge of creating a sustainable and liveable future (Golubchikov, 2020). Through meaningful collaboration and engagement, it becomes possible for learners to advance their learning, and in doing so, help the university achieve sustainable value co-creation in the learning process (Spohrer, 2021; Badawi and Dragoicea, 2023).

The preceding discussion demonstrates that value co-creation is an important process that needs to be adopted in higher education institutions, as it can serve as a vehicle of transformation for both the student and the institution. If successfully adopted, institutions will possess a new set of resources and tools with which to reverse the trend of decline in student numbers. The higher levels of satisfaction that result can help HEIs better tackle the problems related to student retention. However, the current body of knowledge available has not been able to elucidate the avenues and necessary strategies for HEIs to meaningfully adopt and institutionalise value co-creation processes (Bovill et al., 2015; McDonald et al., 2021; Pinna et al., 2023). For instance, in the area of technical and vocational education and training (TVET) field, there is a clear lack of studies with regard to education monitoring and evaluation, teachers' training, trainee assessment, and career guidance (Hassan et al., 2021) which form an important part of collaborative learning in higher educational institutions; hence, value co-creation.

1.4 Context of Higher Education Institutions

The nuance of higher education as a complex service that is widely viewed as a 'credence good' which involves value co-creation is critical to consider (Plewa et al., 2015). An appreciation for the idiosyncratic nature of HEIs is imperative in order to avoid and transcend the commoditisation of education in today's world of mass production. The understanding of the experiential dimension of higher education as a service process is also of vital importance. Vargo and Lusch (2004) discuss knowledge, as a fundamental concept that is central to one of the foundational premises in their S-D logic. Universities and HEIs are widely accepted as being knowledge producers and transmitters as evidenced by the vision and mission of such institutions. Vargo and Lusch look onto service as "*the provision of the information to (or use of the information for) a consumer who desires it, with or without an accompanying appliance.*" (2004, p.9). In understanding customer relationships and experiences, towards building an understanding of value co-

creation processes, one must deconstruct some of these concepts into underlying sub-ordinate concepts, constructs, and processes. Moreover, in exploring the underlying concepts and processes, from co-production to value-in-use, it is observed that there is paucity of studies that empirically investigate both concepts, together, in one study. The role of innovation vis-à-vis co-production has been discussed by numerous authors (Osborne and Strokosch, 2013; Obsorne et al., 2018). However, this was largely limited to the public sector, and in relation to public service organisations. This is due to the fact that much of the literature on co-production originated form the public service sector, including public health and education. In fact, the particularities of the education sector mean that co-production occurs at a high level (Ostrom, 1996; Osborne and Strokosch, 2013).

Although the value co-creation concept, as underpinned by S-D logic, has been hailed by some as a new paradigm that brings promises for unlocking the potential of higher satisfaction, competitive advantage, and ultimately higher profits (Fan and Luo, 2020), practicable operationalisation remains problematic. S-D logic has increasingly gained the attention of both scholars and practitioners, to a point where such attention, and the nature of the scrutiny and discourse surrounding it, are somewhat surprising, given some of the grandiose claims that this new logic proclaims. The grandiose claims include the purportedly paradigm shattering statements, or foundational premises, that constitute S-D logic, which has been espoused as being an important paradigmatic shift from the goods-dominant logic. This position, the grandeur, and revolutionary nature of this thinking is challenged by Tadajewski and Jones (2021), who criticise the works of Vargo and Lusch for omitting the works of many researchers before them, and in doing so, fail to recognise the gradual evolution of thought and scholarship from G-D logic, to other streams that focused on relationship marketing, service marketing, and the centrality of the customer. Nevertheless, a true test of the value of the proffered new logic lies in its ability to aid managers, decision makers, and organisations in creating and co-creating higher levels of value for costumers by translating such thinking into practice. This, however, remains a challenge to-date (Zsigmond et al., 2021). Mainstreaming the adoption of S-D logic in professional practice is exigent.

As the higher education landscape is becoming increasingly competitive (Dollinger and Lodge, 2020), HEIs are finding themselves forced to adopt business practices that risk the marketisation and commercialisation of the sector. Innovation in educational marketing, and an increased focus on students as customers, are proposed as possible solutions to safeguard HEIs' competitiveness and sustainability (Riccomini et al., 2021). However, the outright adoption of certain business practices may not be optimal for HEIs, as educational specificities and particularities need to be considered. Vargo (2009) discusses the education sector as an example for reciprocal service provision between the different actors in a service

setting. Students are widely recognised as the main customers of a university, with students and faculty being the primary stakeholders (Cho, 2017). Value is said to emerge and evolve over time (Taylor and Judson, 2011). Kahu and Nelson (2018) posit that there are immediate outcomes and long-term outcomes when considering value in a higher education setting.

The need to study the concept of value co-creation in universities is no longer a luxury, as students need to be supported with future skills to contribute to solving global sustainability issues. For instance, the World Economic Forum 2020 (World Economic Forum, 2020) has indicated that approximately 85 million jobs could be displaced by 2025 as a result of increased automation across the world due to artificial intelligence. High growth areas vis-à-vis demand for jobs will include the technology sector (Ratcheva et al., 2020; World Economic Forum, 2020; Hassan et al., 2021). There is a growing need to overcome the challenge of creating sustainable and livable futures by helping citizens master specific competencies to meet the future. Building skills required for the future alongside the traditional skills and training learners to become entrepreneurs, training on learning how to learn, learning to unlearn and relearn, communication, foreign languages, and teamwork become important aspects that need to be priorities for universities going forward (de Olagüe-Smithson, 2019). This can be achieved through collaboration with students. In this situation, how and to what extent value co-creation can be achieved by universities in collaboration with students as learning communities needs to be understood. Hence, the following section discusses value co-creation in a classroom setting.

1.5 Concept of Value Co-creation in a Classroom Setting

Value co-creation is a phenomenon that is said to occur in universities when interactions take place between students, faculty, and other stakeholders (Nguyen et al., 2021; Kutz et al., 2022). Within the confines of a classroom, the student-faculty dyad becomes the main locus of interaction and exchange. Fundamentally, the literature suggests that it is possible to explain the occurrence of value co-creation by S-D logic theory. S-D logic theory explains that value co-creation occurs when an interaction takes place between the service provider and the customers (Vargo and Lusch, 2008). In simple terms, when the service provider and the client are satisfied with the service provided, value can be considered as being co-created.

Extant literature shows that the four core components of S-D logic are value, resources, actors, and services. Value is the benefit which could manifest as an enhancement in well-being. Resources could be anything that can be used by an actor for generating value. An actor is an entity that performs purposefully. Finally, services are the application of those resources used for the benefit of that actor or other actors (Vargo and Lusch, 2008). Value is co-created when students, faculty, and an institution interact, and are mutually

satisfied by the service provided by the university. It must be noted here that resources must be adequately understood, as they can be bifurcated into both operant and operand resources. Operant resources, for instance, would include the faculty's own resources, namely, knowledge and skill. This can encompass the ability to teach, and the ability to use a learning management system. Similarly, the student operand resources could include the learning ability and the ability to use a learning management system. The university's resources, such as the learning management system, would be an example of another set of possible operand resources that must be acted upon. It is argued in the literature that it is the operant resources that are most important for co-creation to occur. As far as actors are concerned, the university, the faculty, and the students, are all considered to be actors. The service provided is the education service offered by the university (Leem, 2021). Furthermore, Echeverri and Skålén (2011) argue that there should be no misunderstanding about operant resources between the service provider (e.g. university) and the customer (e.g. student) over the value proposition provided during the interaction between the two, as that may result in value co-destruction instead of co-creation. Co-destruction occurs when the benefit expected to improve well-being actually results in declines instead of improvement (Plé and Cáceres, 2010). One such example could be the loss or misuse of resources (Smith, 2013). Furthermore, co-creation as a concept can be conceived to occur at multiple levels in an institution which may include initiatives by individuals, co-curriculuar and extra-curricular activities, teaching-learning initiatives, and activities concerning operations from strategy implementation to pedagogy (Cook-Sather et al., 2014). However, Cook-Sather et al. (2014) stated that challenges that occur during the process of co-creation need consideration in order to realise the outcome of co-creation. For instance, co-creation could enable institutions to realise value, while simultaneously having the possibility to increase the responsibilities of the staff and the effort needed to co-create during the process of education provision. It can result in an increase in demands on both students and staff by way of having to devote more time at the institution (Cook-Sather et al., 2014; Lubicz-Nawrocka, 2017).

As previously stated, when one applies S-D logic in relation to a classroom environment, the primary resources become the students and the faculty. Examples of some of the various ways in which value co-creation can manifest include the following:

- Enhanced interactions between students and faculty improves the students' learning experience and meet their expectations (Pinar et al., 2011).
- Higher levels of responsibility assumed by students which enhances the learning process for all students involved.
- Flexibility in student learning and personalisation of the programmes is enhanced (Bowden and Alessandro, 2011).

- Co-creation of knowledge leading to improvements in students' knowledge and skills (Yeo, 2009).
- Positive impact on students' performance which affects student satisfaction (Nystrand and Gamoran, 1991) vis-à-vis their experience, both in academic and non-academic aspects of student life (Maxwell-Stuart et al., 2018).

Furthermore, when students put their knowledge and skills into practice while collaborating with the faculty members, this can lead to a dramatic change in the self-confidence of those students. Co-creation can also result in improving students' ability to know and reflect on their professional and personal development (Mercer-Mapstone et al., 2018; Bovill, 2020). Benefits accruing to students through value co-creation in the classroom include achievement of higher satisfaction levels and qualitative interactions, in addition to advanced graduate capabilities. Benefits accruing to universities through the value co-creation process include enhanced image of the university, higher levels of student loyalty, and enhancement in student-university identification (Dollinger et al., 2018).

While the literature includes some empirical studies that have established a relationship between value co-creation and student satisfaction (Giner and Rillo, 2016), other equally important benefits and outcomes remain unaddressed. For instance, Chatzara and Tskiakis (2023) argue that there is a need to understand how value co-creation works in educational institutions, and whether it is feasible to create the right conditions for the institutions to achieve positive outcomes at various levels during the implementation of value co-creation. One related area that warrants further investigation is the possibility of students developing co-innovation competency skills and innovation behaviour. Co-innovation is an important value co-creation factor (Lee et al., 2012). Co-innovation competency is considered an important attribute that must be fostered and developed in students. However, the concept of co-innovation needs further empirical studies and support, especially within the context of HEIs (Volles and Switzer, 2020).

Furthermore, in association with other value co-creation concepts like co-production and value-in-use, students are expected to improve their innovation behaviour (Lusch and Vargo, 2008; Wu, 2013; Dollinger et al., 2018; Dziewanowska, 2018) which is an important consideration of educational institutions. It is expected that the extension of the application of the concept of co-creation of value at all educational levels could contribute to the enhancement of educational service provision in a dynamic manner. This in turn could lead to the generation of a higher-level student engagement, learning, and satisfaction.

The preceding discussion indicates that the value co-creation process is less understood in the context of higher education institutions, especially when looked within a classroom setting. This gap in the available

knowledge provides the basis of this research. Accordingly, this research aims to contribute to the current body of knowledge through the concept of value co-creation as applicable to the higher education institutions during the interaction between students and professors in a classroom setting. This in turn is expected to provide a mechanism by which it would be possible to explain how value co-creation leads to achievement of better student outcomes (e.g. benefits) through a study of their behaviour within the confines of the classroom. Some of the important benefits that are expected to accrue to students through this research include building innovation competency skills, and generating innovation behaviour in students, by enabling meaningful student participation in the value co-creation process. Keeping in view the above, this research has identified the problem that is currently affecting higher education institutions. This is discussed in the next section.

1.6 Research Problem

The main research problem is the difficulty HEIs have in understanding and exploiting the purported benefits of the concept of value co-creation. Innovation has become a buzz word in all institutions at the higher education level. There is growing need for all institutions to actively encourage students to innovate. One promising area that is still not well understood is that of the innovation behaviour of students. Studying this area could significantly contribute to innovation capabilities and outputs. The literature indicates that innovation behaviour can be construed as a value (Osorno-Hinojosa et al., 2022) which could be developed in students. However, HEIs lack adequate awareness and knowledge of the process of value co-creation (Nguyen et al., 2021) which has an inherent supporting characteristic, namely, innovation (Prahalad and Ramaswamy, 2003). Empirical studies that could guide HEIs in this regard are far and few. The factors that could be controlled to generate value, co-create value, and develop individual innovation behaviour of students in a simple and efficient way are not in the knowledge of HEIs. Thus, the problems faced by the HEIs include the lack of knowledge with regard to: The concept of value co-creation that can produce innovation behaviour of students; the factors that affect the production of innovation behaviour; the relationships amongst those factors; and the benefits that could be derived thereof.

Furthermore, this research specifically concerns value co-creation as it occurs in a classroom in a higher education institution setting. A review of the literature revealed that value co-creation could occur in the classroom through an interaction between the instructor and the students. However, there is no clarity in the literature as to how co-creation could occur in a classroom when one considers the prospect of student innovation. In fact, the literature is silent on the predictors of co-creation when students innovate through interaction with instructors in the classroom. Some researchers have argued that such a possibility cannot

be ruled out. Accordingly, this research investigates this aspect. Hence, the problem statement is translated into the following research questions.

Research question 1 (RQ1): What factors contribute to the value co-creation process in a higher education institution during classroom interaction between instructors and students that support students to innovate/invent and how are they related to each other?

Research question 2 (RQ2): What is the nature of the values co-created and how do they occur during the value co-creation process in a classroom?

Research question 3 (RQ3): Are there levels under which students could be classified and engaged to innovate as part of the value co-creation process and if so how to classify the students according to different levels?

1.7 Research Aim

The main aim of this research is articulated as follows:

- Development of a theoretical model that demonstrates value co-creation in a classroom setting in a higher education context with a focus on innovation.

The aim provides an idea of what this research sets out to achieve.

1.8 Research Methodology Overview

The research questions are concerned with the 'what' and 'how' aspects, which led to the researcher adopting the post-positivist paradigm which accommodates both quantitative and qualitative research methods. The primary target population for quantitative study was students studying in multiple disciplines in a higher education institution. The target population for the qualitative study included the stakeholders involved in the value co-creation process. This includes students, instructors, alumni, and employers. Thus, this research involved the administration of a survey amongst students to answer part of RQ1, RQ2 and RQ3 and conducting semi-structured interviews to answer part of RQ1, RQ2 and RQ3. The survey instrument was designed to answer the questions concerning factors that contribute to the value co-creation process in a higher education institution, throughout classroom interaction between teaching faculty and students that support students to innovate/invent. The first section of the survey instrument was designed to collect information regarding the levels of interest of students vis-à-vis participation in the innovation process. This was expected to provide an understanding of the level of interest that various types of students

had with regard to participation in the value co-creation process in the classroom. The insights garnered from such survey information were useful in addressing RQ3. The study investigates the nature of the values co-created during the value co-creation process in a classroom. Semi-structured interviews results were used to support the quantitative study, whilst simultaneously answering questions concerning how the value co-creation factors relate to one another, and how they occur during the value co-creation process in a classroom.

An original research theoretical model was developed comprising a dependent construct, namely, student benefits, that is considered to be a co-created outcome that emerges through the innovation process that could occur in a classroom setting. The predictor variable is conceived to be the construct of co-production. The mediator variables are the value-in-use and individual innovation behaviour of students that mediate between the independent (co-production) and dependent (student benefits) variables that intervene in the value co-creation process. Three independent interventions were identified as affecting the individual innovative behaviour of students. These are included in the theoretical framework, representing a novel contribution that enriches and enables the investigation of how the individual innovation behaviour of students is influenced by specific behavioural factors that could contribute to, and optimise, co-creation.

Furthermore, the literature suggests that there is a lack of studies which have examined the level of consumers' interest in participating in co-creation processes, particularly in academia (Pini, 2009). The results of an examination of the level of participation in the value co-creation process can reveal insights on when and how students could be engaged in the co-creation of value. More specifically, in the higher education sector, the focus turns to co-creation of knowledge, which refers to "*learning to collaborate and learning through collaboration*" (Antonacopoulou, 2009, p.427). The importance of such an investigation relates directly to RQ3, which is explored through semi-structured interviews to discern and uncover antecedents from student participation.

The theoretical model developed relied upon the seminal works of many notable authors. These included Ostrom (1996), a Nobel laureate, Amabile (1996) of Harvard Business School, Prahalad and Ramaswamy (2003), and Vargo and Lusch (2004), all of whom are/were academics affiliated to reputed universities. These researchers published many influential articles. The analysis of the data, the discussions on the findings, evaluation of the findings using already published results, and the conclusions, led the researcher to challenge certain published concepts of some of the authors mentioned above. This resulted in recommendations that could potentially modify those concepts. These are discussed in detail in the last chapter.

1.9 Significance of the Study

The significance of this research lies in its ability to contribute to the body of knowledge relevant to the value co-creation domain, as related to the classroom setting in the higher education context. Additionally, this research has contributed to theory and practice. As far as the occurrence of value co-creation in classroom settings, this research has empirically demonstrated such by studying the occurrence of value co-creation in terms of individual innovation behaviour at a university in Bahrain. A theoretical model was developed using a theoretical framework to examine how the research gaps identified through the literature could be addressed. The results showed that the co-production of value, in terms of individual innovation behaviour and student benefits, occur in a classroom setting in a higher education context. Furthermore, the model demonstrated that value is co-produced as part of the co-creation process as individual innovation behaviour in the presence innovation competency factors. The interaction amongst the innovation competency factors and co-production was found to lead to the generation of a new amalgam construct, namely, co-innovation competency. Apart from the factors included in the theoretical framework, the qualitative study produced new factors that could affect individual innovation behaviour and student benefits. This adds to body of knowledge in the value co-creation discipline. Additionally, the research has contributed to theory, and has suggested revisions to the S-D logic theory, the orthogonal model of innovation and competence developed by Prahalad and Ramaswamy, the social exchange theory, and the innovation competence model of Penttilä et al. (2011; 2012). This research concludes with significant contribution to practice and future research.

1.10 Thesis Structure

This thesis is organised across eight (8) chapters.

Chapter 1 (Introduction) presented the introduction to the study and an overview of the thesis in terms of context, significance, gaps, aim, research questions, and methodology.

Chapter 2 (Literature Review) presents a comprehensive, robust, and rigorous review of the literature. The literature discusses 9 theories which are critically analysed, providing theoretical breadth, and appropriate depth vis-à-vis conceptualisation of relevant theoretical constructs. At every stage, related gaps are highlighted.

Chapter 3 (Theoretical Framework) discusses the theoretical framework and its development in terms of construct relationships and hypotheses formulation. This chapter further elaborates on the conceptualisation and deployment of various constructs as per previous studies.

Chapter 4 (Research Methodology) presents an overview of the main components of a research strategy, including widely used research paradigms, epistemologies, ontologies, research methods (quantitative and qualitative) and approaches (deductive and inductive). This chapter presents a brief account on the application of axiological considerations. This is followed by justification of the adopted research strategy for this study, and a detailed account of other related methodological including research design, sampling, and data collection protocols. The chapter ends with an overview of data analysis aspects relating to both the quantitative and qualitative research methods employed.

Chapter 5 (Quantitative Data Analysis) presents the quantitative instrument's data analysis, with a step-by-step account of the different tests conducting including validity and reliability. This is followed by an account of the structural equation modeling and path analysis procedures. The hypotheses are tested to identify which theoretical relationships are found to be supported.

Chapter 6 (Qualitative Data Analysis) provides a detailed account of the thematic analysis conducted for a total of 20 semi-structured interviews. Significant findings are discussed.

Chapter 7 (Discussion) presents the full set of findings, both quantitative and qualitative. The outcome provides a holistic understanding of the co-production of innovation behaviour and student benefits in HEIs. The qualitative data is used to provide explanations for unsupported hypotheses. The findings are compared with related outcomes of previous studies. Finally, the findings are discussed in relation to each of the research questions to ensure the aim of this study is addressed in full.

Chapter 8 (Conclusion) concludes this research by presenting the main findings in terms of contribution to knowledge, theory, policy, and practice. The novelty of the contribution to scientific literature is highlighted, followed by a discussion of the limitations and future study recommendations.

Chapter 2 - Literature Review

2.1. Chapter Introduction

Value co-creation is a concept that is increasingly gaining the attention of both practitioners and researchers alike, in different sectors, including the higher education sector (Brambilla, 2016; Taxt et al., 2022). There is widespread recognition of value co-creation, as a phenomenon that occurs in the higher education context. However, Dziewanowska (2018) states that research on value co-creation in higher education institutions is scant. Comprehensive conceptual models explaining the concept of value co-creation and its operationalisation are hard to find in extant literature (Díaz-Méndez and Gummesson, 2012; Elsharnouby, 2015; Nguyen et al., 2021). Some of the still underexplored areas that have been examined by researchers vis-à-vis value co-creation in the higher education sector include branding (Boyle, 2007; Pham et al., 2022; Spry et al., 2022) curriculum design and development (Taylor and Bovill, 2018; Bovill and Woolmer, 2019; Dollinger and Lodge, 2020; McDonald et al., 2021; Galpin et al., 2022; Johnston and Ryan, 2022), innovation (Rubalcaba, 2022; Taxt et al., 2022), education marketing (Sutarso et al., 2018; Nguyen et al., 2021), research infrastructure (Ketonen-Oksi and Valkokari, 2019), university-industry collaboration (Mathisen and Jørgensen, 2021; Osorno-Hinojosa et al., 2022), student engagement, academic performance, learning experience (McDonald et al., 2021; Kutz et al., 2022) and sustainability (Kivimaa et al., 2016; Wright et al., 2022). However, these studies are far and few, and suffer from some common limitations. Many of the studies adopted a case study approach. As such, most of them call for future research to be conducted in other universities and countries. Further research on value co-creation within the higher education setting is imperative; in order to be able to arrive at more concrete conceptualisations of value co-creation that can inform managerial practice and serve as the basis for policy setting and decision making. Value co-creation is considered an emerging paradigm in the fields of business, marketing, and innovation. This description of value co-creation suggests that value co-creation can occur when there is an interaction between parties in different fields including the higher education sector. As such, there is a need to understand the concept of value co-creation and its relevance to the higher education service setting.

This chapter reviews the literature concerning value co-creation and explicates the main factors involved. The knowledge gaps are discussed throughout. The review of the literature begins with the main concepts of value, co-creation, and their multifarious conceptualisations. This is followed by a discussion of the most important and relevant theories which include: The service-dominant (S-D) logic, self-determination theory (SDT), social exchange theory, experience economy theory, stakeholder theory, creativity and innovation theory, social capital theory, theory of co-production, in addition to the INCODE model.

2.2. Methodology used in Conducting the Literature Review

Bougie and Sekaran (2019) argue that a critical literature review helps researchers to become familiar with knowledge that is relevant to the research problem under investigation. The method chosen for this literature review is the critical literature review, which is in line with the recommendations of various authors including Cohen et al. (2018), Bougie and Sekaran (2019), Barton (2021), Creswell and Creswell (2021), and Saunders et al. (2023). Accordingly, this literature review was compiled accordance with figure 2.1.

The method followed in conducting the critical literature review

Definition of the field of research – Value co-creation in a higher education context within a classroom setting

The relevant key concepts, topics, theories, issues, research and ideas in the field of value co-creation (including, where relevant, gaps in the field of value co-creation) have been identified and discussed in individual sections corresponding to specific constructs identified for investigation

Latest knowledge in the field of value co-creation has been identified and is related to the core concept of innovation behaviour of students and value co-creation through innovation

The context of the research – value co-creation in a higher education institution within the classroom setting has been identified

Seminal and landmark ideas and research in the field of value co-creation have been identified

The need for the research to be conducted has been established and justified; and its significance and originality have been established based on identified gaps in the literature

The rationale for the direction in which study has been carried out has been set out based on a critical review of the research papers reviewed

Points towards the methodology to be adopted in the research by reviewing the various research efforts of other researchers who have conducted research in value co-creation

The focus of the research has been established which is innovation behaviour as a value co-created component that occurs during the classroom teaching and learning process

Justification of the warrants or assumptions to be made and used in the research design have been provided.

Figure 2.1: Critical literature review methodology (Source: Author)

As illustrated in figure 2.1, a critical literature review methodology revolves around a number of important steps, beginning with defining the area of research. This thesis defines the area under investigation as being value co-creation in a higher education context within a classroom setting. A number of papers concerning this topic, including seminal works, were identified from the literature to review the relevant collection of published studies in the area of value co-creation. This is useful towards identifying the current state of knowledge available in the literature. The seminal papers included were those of Ostrom (1996) as related to co-production, Vargo and Lusch (2016) related to value-in-use, Amabile (1996) as related to creativity and innovation behaviour, Marín-García et al. (2013) as related to the competence model, and Dollinger et al. (2019) as related to benefits accruing from value co-creation in an educational context. The proposed theoretical framework relies on the research work of Leem (2021) and Marín-García et al. (2013). Identification of such seminal works was done through isolating the key concepts that are regarded as being of critical importance to this research. Furthermore, the researcher identified the topics and theories that concern value co-creation in the context of HEIs. Moreover, the review involved determination of the gaps in the literature on value co-creation in the context of HEIs, with a focus on the classroom setting, in order to provide a basis for the write up covering the various factors that affect value-co-creation. This is depicted in steps 2 and 3 and is corroborated by Hart (1998). Hart (1998, p.13) states that "*the selection of available documents (both published and unpublished) on the topic, which contain information, ideas, data and evidence written from a particular standpoint to fulfill certain aims or express certain views on the nature of the topic and how it is to be investigated, and the effective evaluation of these documents in relation to the research being proposed.*"

The next step (step 4) was to critically review the context of research. Papers that investigated the co-creation of value in a higher education context within a classroom setting were critically reviewed. New ideas considered useful were identified, as pertinent to the scope of the research. The factors that affect value co-creation in a higher context were reviewed. This allowed the researcher to identify the gaps in the literature, after repeated review of papers as depicted in figure 2.3.
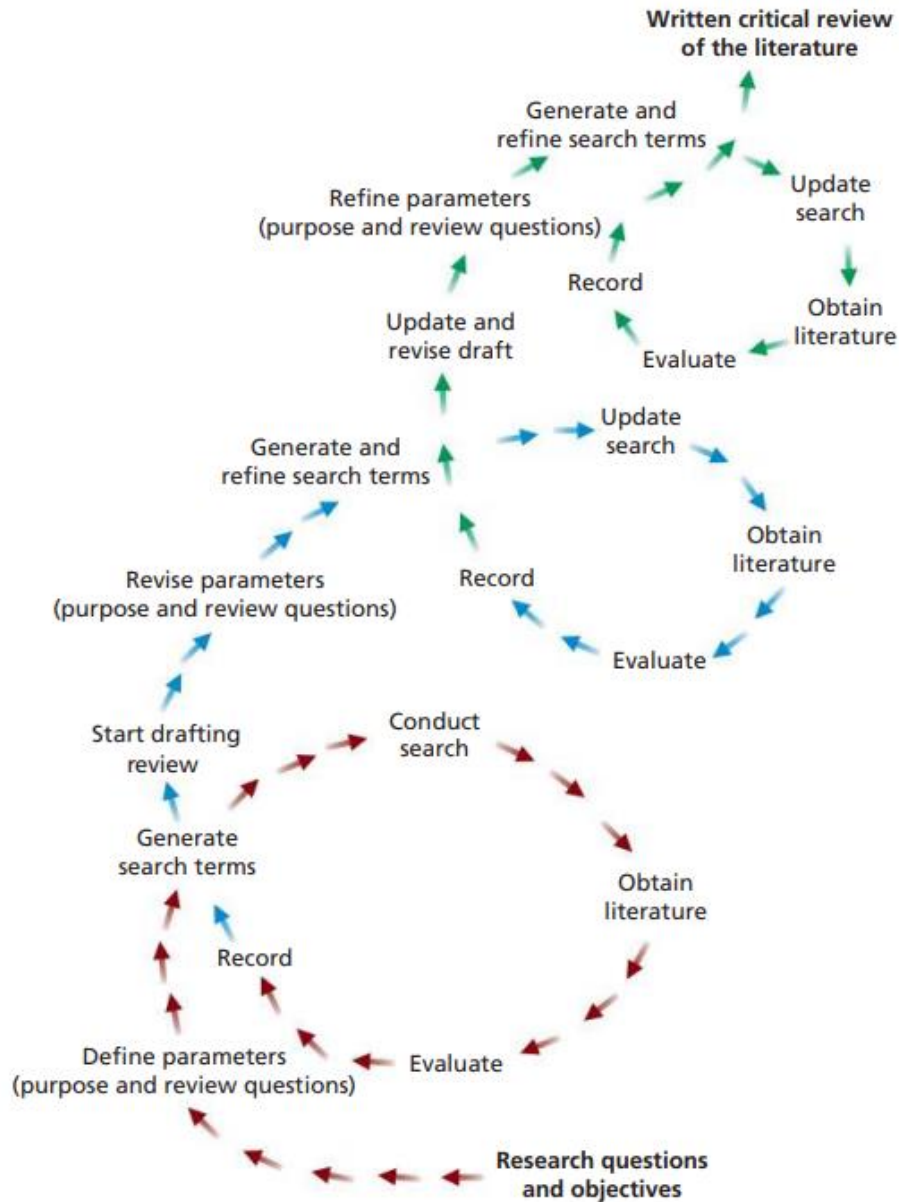
Figure 2.2: Writing a critical literature review (Source: Saunders et al., 2023)

As part of the critical review of the literature and as mentioned earlier, seminal papers were reviewed to understand and define the various concepts that were used in this research. The critical review of papers provided a strong foundation and validation on the need for this research, as examples of current research efforts provided the direction to address the aim of this research. Furthermore, the rationale, as well as other aspects that led to the conduct this research, were determined by reviewing the relevant literature in the way suggested by Creswell and Creswell (2021) who identified the following steps.

Process of critically reviewing the literature and compiling the literature review

Databases were searched for journals, journal articles, books, reports, internet-based publications, and other published material.

↓

Identification of key words such as value, co-creation, value co-creation, innovation, co-innovation, value-in-use, higher education, classroom setting, skills, competence, competenc, etc. Databases searched include EBSCO, ProQuest, Google Scholar, Sustainability, ERIC, Scopus, Web of science, Springer, MDPI (Multidisciplinary Digital Publishing Institute), Elsevier, etc.

↓

Journal papers, books, and other articles on the topic of value co-creation were accessed to isolate a range of articles that address the concept in various ways. Critical review of those publications provided a good view of the topic under investigation.

↓

Browsing through the articles revealed insights into the core issue of value co-creation and related knowledge. Articles were segregated and stored in several folders on a computer for further reference. This process was repeated again and again to obtain in-depth knowledge about the topic of research.

↓

Through this process the research topic was consolidated with regard to its definition, purpose, rationale, theories useful to understand concepts and their operationalisation, factors connected to the core concept of value co-creation, the various relationships and models concerning value co-creation, limitations of current research, contexts under which the researchers have conducted their research, problems concerning understanding and implementing value co-creation, gaps in the literature, methodological aspects, and conclusions. The research questions were identified through a process of critical review of the various papers published by various authors with a final convergence on seminal authors and their publications that were useful to conduct this research.

↓

Through the process mentioned in the previous step, a literature map was created that defined the various sections that were to organised in a structured manner leading to the compilation of the critically reviewed literature with appropriate references cited in the body of the literature.

↓

The culmination of this process was a literature review that was structured thematically covering important concepts leading to a situation wherein literature gaps were identified by critiquing past papers and elucidating deficiencies, issues in methods used, and what knowledge could be added to the relevant literature.

Figure 2.3: Process to compile the critically reviewed literature (Source: Author)

The whole methodology, as adopted in this thesis to critically review the literature, could be summarised as follows:

The following are part of a Critical Literature Review	The following <u>are not</u> part of a Critical Literature Review
- To identify significant pieces of research on value co-creation. - To set the scene and provide the context related to value co-creation in higher education within a classroom setting in terms of the content and methodology. - To acknowledge the relevant work that has been done by others in the field of value co-creation. - To critique the research work of other scholars' research outcomes on value co-creation and related areas. - To identify any possible gaps in the literature and justify the researcher's own enquiry. - To develop a theoretical framework to fill the gaps in the literature as identified above. - To identify the terminology and methodology associated with the research. - To write the comprehensive and cohesive PhD thesis comprising of the various research related contents.	- To explain the methodology of the researcher's approach. - To list everything that has been published on value co-creation in a classroom setting within the context of a higher education institution. - To publish the findings of this research as journal papers.

Table 2.1: Summary of the critical literature review (Source: Barton, 2021 – The University of Manchester Library)

In summary, this research followed the method of critical literature review which enabled the researcher to critically review the current body of knowledge, identify the gaps, and identify the context. These steps were important, and provided a basis for developing the aim, research questions, and research methodology used to answer the research questions.

2.3. Concept of Value

Value is a central concept in marketing literature. This goes back to the early 1980s at least, when the concept was first discussed, and researched, in terms of customer value (Zeithaml et al., 2020). Despite the term's centrality and pervasiveness in marketing literature, it remains a vague and elusive concept (Woodall, 2003; Grönroos, 2011; Heinonen et al., 2013). This becomes all the more evident when combing through and surveying the multiplicity of perspectives, and multi-dimensional conceptualisations, through the works of different authors.

Many researchers view value as being individualistic (Grönroos, 2011), which leads to examples being proffered from an idiosyncratic and phenomenological perspective. Examples of value created are many. One such example could include reviews and ratings posted by customers, and the increased engagement of customers with the social commerce (s-commerce) platforms (Attar et al., 2022). Alternatively, value has also been said to emerge during pre-deal and post deal activities in business transactions (KPMG, 2022). According to KPMG (2022), during pre-deal value is likely to occur either for the customer or the supplier; an example of which could be the incorporation of potential upsides during the sale or acquisition process. Similarly, post-deal value could occur in the form of repositioning assets of a firm that enhances earnings before interest, taxes, and depreciation (i.e., EBITDA) (KPMG, 2022). Prahalad and Ramaswamy (2004b) argue that interaction is an important part of the co-created experience, which carries value. Value emerges from the locus of exchange, through the interaction itself, which is the basis of the individual's co-created experience, which in turn constitutes the basis of value creation. Thus, value is (co)created in a specific time and space. Within the context of higher education, and within a classroom setting in specific, value would emerge through the relationship between the professor and the student (Brambilla, 2016; Nguyen et al., 2021). The myriad examples on value co-creation, coupled with a plethora of conceptualisations, necessitates further investigations in order to reach a higher level of consensus that can address this gap in the literature, and in doing so achieve some semblance of commonality in the understanding of value and its (co)creation.

Although the various conceptualisations of value can cause confusion, there are other definitions that add to the confusion further, making it even more difficult to establish what value could be (Woodruff, 1997; Grönroos, 2011). In the pursuit of a better understanding of value, a useful point of departure would be to understand, and bifurcate, such value based on the main parties involved, and from the perspective of each. At the most basic level there are two main parties, or actors, involved in the value exchange. Different values are extracted and obtained by these different parties. Within the same exchange, value is extracted for the firm, and another form of value is extracted for the customer as the main beneficiary. Zeithaml et al. (2020) organise the conceptualisations of value under three paradigms: The positivist paradigm, the interpretivist paradigm, and the social constructionist paradigm. The purely positivist paradigm is arguably incompatible with conceptualisations of value co-creation that rely on the service-dominant logic for its theoretical underpinnings due to phenomenology. Paradigmatic divergence in conceptualisation of customer value needs to be addressed in order to arrive at a more useful and unified approach (Zeithaml et al., 2020).

Dziewanowska (2018) classifies value as intrinsic (self-acceptance, community) and extrinsic (fame, money, image) and these values are related to the goals students relate to their study at university. Vargo and Lusch (2008) expound on the concept of value within the context of co-creation through their seminal works that discuss the service-dominant logic theory. The authors argue that recent developments related to the concept of service have now started to concentrate on joint creation of value (in other words value co-creation). Henceforth, this research focuses on the concepts of value created and co-created in organisations, with particular attention paid to the higher education institution.

2.4. Value Creation

Until recently, most organisations were predominantly inward looking, and viewed value creation from an industrial lens, through the principles of economics and the management of the value chain (Prahalad and Ramaswamy, 2002). The consumer was considered exogenous to the value creation process, and value was seen as being discrete and contained within products or services that were exchanged in the market. With an ever increasingly competitive market in most sectors, spurred by the forces of globalisation, the rise of e-commerce, *inter alia*, organisations are forced to look for new ways to innovate, compete, and satisfy consumers. This started with the boundaryless firm, by expanding the value chain to include suppliers, whereby organisations worked closely with their suppliers, as partners, towards delivering greater value to consumers. Value creation was mainly viewed as a product of innovation on the one hand, and cost-lowering efficiencies on the other, where both or either would traditionally emerge from within the organisation itself, or through collaboration with the supplier in relatively more recent times. These tensions

are partially addressed by the concept of open innovation; however, Pedersen (2020) argues that, in the context of open innovation, the concept of value creation is especially opaque.

Grönroos (2011) asserts that very little is known about the process of value creation, what it comprises, in addition to when this process starts or ends. He further observes that value creation is not an all-encompassing concept either. In fact, a series of firm processes are required, from design to production, in order for value creation to be facilitated. This position is well articulated by Grönroos (2011) in his criticism of the absent distinction between value creation and value-in-use by Vargo and Lusch (2004). Further still, the literature suggests that current notions of the concept of value and value creation need to be reconsidered (Miller, 2016; 2022). This is due to the fact that many companies still subscribe to the view and philosophy of 'value capture' rather than value creation (Miller, 2015). Value capture by companies focuses on maximising benefits by creating competitive advantage using utilitarian effort that are based on social value theory. Moreover, Kohli and Grover (2008) argue that the understanding of value needs to account for indirect and intangible benefits, with an expanded view of such value, beyond economic or financial benefits.

In order to reach a deeper understanding of the value creation process, it is important to distinguish between firm-driven value and customer-driven value (Grönroos and Gummerus, 2014). There are two perspectives, or viewpoints, that must be considered according to Service Logic. These two perspectives allow for a trifurcation of value (generation) spheres: The provider sphere, the customer sphere, and the joint sphere. Thus, there appears to be some inconsistency in how the term 'value creation' is understood and deployed. Is value created by the firm? The customer? Or both?

Researchers are divided on the definition of value creation, with some arguing that social value is more important when business transactions take place, leading to value capture, while others have used the economic dimension to define value creation in business transactions, leading to creation of value (Santos and Zen, 2022). The definition of value creation gets further complicated when one examines the definition put forth by Vargo et al. (2008), which states that there have to be two actors in the value creation process, for instance, the seller and the customer. The value created for each could be different. Vargo et al. (2008) suggest that for a company, the value created is the exchange value, or value-in-exchange, whereas for the customer it is the 'use value', or value-in-use, that is relevant. One argument that emerges from the preceding discussion is that the main concept of value co-creation and its related concepts, like co-design, co-production, and co-innovation, can now be brought under proper perspective while the concept of value co-creation is being discussed (Saha et al., 2022). Although this argument can provide linkage between

value co-creation and other components of value creation, it is not entirely clear whether value creation should be the sole responsibility of an organisation, the customer, or the joint responsibility of both (Grönroos, 2011; Saha et al., 2022). Certain authors clearly argue that value creation occurs by the customers, for the customers, and that the firm only facilitates such value creation (Grönroos, 2008). This example would be consistent with the trifurcated value generation spheres mentioned previously. Other authors subscribe to the view that value is created by the firm for the customers (KPMG, 2022). Prahalad and Ramaswamy (2004b) argue that it is the interaction between a firm and its customers that produces value. In the same vein, Payne et al. (2009) argue that service encounters are the locus of value creation, as represented by a string of interactions between a firm and its customers, through various touch points, or in a social contextual view that involves human and social relations and interactions. One example of this would be the relationship between the faculty member and his/her students in a classroom. In another discourse, the International Federation of Accountants (IFAC) (2020) expound that value is defined only by customers, investors, and other stakeholders, and created through an organisation's strategy, purpose for its existence, and its business model. In this process, it considers all the resources available at the disposal of the organisation, capital and the various relationships in a unified manner.

The abundance of different perspectives and definitions is evident, extending all the way to the occurrence and understanding of value itself, its creation, and the actors involved in the process of value creation. Hence, an important corollary that emerges here is that the concept of value creation requires a careful understanding of which one of the following activities, namely the service, or product, or any other activity, it is exactly that may lead to value creation. Without considering that it may not be possible to define what exactly the value created is, by whom, and when. The literature shows that researchers have studied the concept of value creation in the context of service industries including e-commerce (Zhu, et al., 2022), higher education (Leem, 2021), finance (Nueesch et al., 2014), information technology (Kohli and Grover, 2008), *inter alia*. In each one of these examples, the value created could be dependent on the particular service, or product, or any other activity. In the case of e-commerce there is an interaction between the customer and the e-commerce platform. In the e-commerce example it is possible that the customer derives functional value, service value and relationship value which occur once the customer has completed the purchase of the goods, or while experiencing the services (value-in-use). In contrast, value could be created for the supplier in the form of continuous use of the e-commerce platform by the user. In this instance, it can be understood that both parties, or actors, are creating value for one another in the services sector. This framing extends to the higher education, in a similar fashion, whereby the student experience and personalised education services acquired by the students, in the form of the student-lecturer relationship, can be considered as part of the value created for the student. This is one form of value-in-use. As such,

where HEIs are concerned, relevant values created will include student satisfaction and loyalty (Prebensen et al., 2016; Leem, 2021). Insofar as the product is concerned, it is possible that value is created through the concepts of value-in-exchange and value-in-use (Leem, 2021). In the context of financial services, value-in-use can be produced for customers when a bank leverages its unique resources for the mainstreaming of good practice in relation to customer value. This includes customer value derived from internet-based transactions that allow for cost savings, greater convenience, and higher satisfaction (Melnick et al., 2021). Customer value creation is said to be both a process and an outcome.

Based on the preceding discussion, it is reasonable to infer the following: Value creation occurs when there is an interaction between two or more parties in many sectors, including the education sector, when there is a transaction between two parties or more. The values created occur at different points in the interaction between parties, including when the product, or service, or both, are in use, or sometimes even before use or after use. The value created could be for the supplier by the customer, by the supplier for the customer, for the customer by the customer, for the supplier by the supplier, and to others by both customers and suppliers or service providers. There are different types of value that are created which are contingent on the nature of the offering. The offering could represent a service or product provided to the customer. Moreover, the value will also depend on the point in time in which this is looked at, as the value extracted for each party may emerge at different points, with value being dynamic and cumulative.

Extant literature postulates that value is not necessarily only created during interactions, but that it can also be destroyed. For instance, de Borba (2022) observes that value can be co-destroyed during interaction between parties. To expound this phenomenon, de Borba (2022) argues that in the context of banking, co-destruction could occur during exchange of services, leading to the possible downfall of companies. This line of enquiry highlights the lack of clarity as to whether value is created or destroyed whilst a service is being offered, or products being sold. Notwithstanding, many authors have arrived at a consensus on the fact that value is indeed created while there is an interaction between two parties like supplier and customer, and in fact, there are values that are co-created during such interactions (Prahalad and Ramaswamy, 2004b; Vargo and Lusch, 2008; Vargo et al., 2008; Grönroos, 2011; Chatterjee et al., 2021).

The rest of this chapter will review the literature on value co-creation, as a more relevant concept that constitutes the central issue of investigation in this research. The review will afford particular focus to value co-creation in higher education institutions where possible.

2.4.1. Value Creation versus Innovation/Innovation Behaviour

Previous studies suggest that value creation occurs when there is an interaction between two or more parties. This applies across a wide range of sectors including the education sector (Prebensen et al., 2016; Leem, 2021). More specifically, co-creation is found to occur when there is a transaction between two parties or more (Prahalad and Ramaswamy, 2004b; Vargo and Lusch, 2008; Vargo et al., 2008; Grönroos, 2011; Chatterjee et al., 2021). The values created may emerge at different points throughout the interaction between parties, including when the product, or service, or both, are in use, or sometimes before use, or even after use (Lemon and Verhoef, 2016). There are different types of values that are created which are contingent on the nature of the offering. The offering could represent a service or product provided to the customer (Kohli and Grover, 2008; Nueesch et al., 2014; Leem, 2021; Zhu, et al., 2022). Moreover, the value will typically depend on the point in time at which it is being looked at, as the value extracted for each party may emerge at different points, with value being dynamic and cumulative (Lemon and Verhoef, 2016). As for the concepts of innovation, innovation behaviour, and innovation competence, these are considered as value that is (co)created. More specifically, within the context of a classroom, the literature suggests that innovation (or innovation behaviour) is a value created and co-created by the students and their instructors. This is an argument that is supported by the concepts postulated by Phan et al. (2010) and Nguyen et al. (2021). Thus, there is a clear element of linkage between value creation and co-creation on the one hand, and innovation on the other, in a classroom setting.

As previously mentioned, there are arguments found in extant literature that claim innovation and innovation behaviour are values that are created (Al-shami et al., 2023). Innovation can be considered an important competence that must be inculcated into students for them to innovate. The ability to innovate is more accurately referred to as innovation competency. It is recognised in the literature that creativity and novelty, or new ideas, appear to be two of the main elements common across the multitude of definitions for innovation competency. In other words, the concept of innovation competency is influenced by creativity and new, or novel, ideas (Tidd and Bessant, 2009; Boza et al., 2014; Keinänen and Kairisto-Mertanen, 2018). Innovation competency represents a set of individual characteristics, knowledge, skills, and attitudes which are connected to the formation and implementable of novelty or novelties by collaborating in complex innovation processes (Bruton, 2011; Peschl et al., 2014). Other terms are used in the literature, alongside innovation competency, to signify innovation. These terms include innovation behaviour, innovative behaviour, and innovative work behaviour, as innovation is largely regarded as a behavioural aspect in students and staff (de Jong and den Hartog, 2010; Strobl et al., 2018; Lei and Hock, 2020). Hence, innovation assumes significance in any organisation, including HEIs.

In the context of the higher education institution, the innovation experience of students is also found to be of importance for its effects on student benefits. For instance, Micheal and Marjadi (2018) argue for enhancing the innovativeness of students by HEIs, as this would increase their employability and job prospects. However, educating learners to be truly innovative and capable of generating meaningful innovations that serve innovative knowledge economies is considered a challenge (Avvisati et al., 2013). In fact, many of the Gulf Cooperation Council countries are found to suffer from such a challenge according to the global innovation index report (WIPO, 2023) which states that most GCC countries have faced difficulty in translating investments and inputs into innovation outcomes. Bahrain in particular has underperformed relative to its neighbours, coming in last in the GCC in 2021, and progressing to next to last, at 67th (out of 132 economies), in the year 2023. An important consideration for this research in dealing with innovation, or innovation behaviour, of students is its relationship to value co-creation. There is evidence in the literature to indicate that innovation occurs as part of the value co-creation process (Takahashi and Takahashi, 2021; Chatenier et al., 2022).

Based on the aforementioned, it becomes possible to discern the differences between the concepts of innovation or innovation behaviour on the one hand, and value creation on the other. There is a distinction between the two different phenomena, which can potentially be observed inside a classroom. Some the features of the two phenomena are provided in the table 2.2 below, which provides clarity as to the distinct nature of each concept.

Value Creation	Innovation and Innovation Behaviour
Value emerges from the locus of exchange, through the interaction itself; which is the basis of the individual's co-created experience, which in turn constitutes the basis of value creation. Thus, value is (co)created in a specific time and space. Within the context of higher education, and within a classroom setting in specific, value would emerge through the relationship between the professor and the student (Brambilla, 2016; Nguyen et al., 2021).	Individual innovation behaviour, or innovative behaviour, or innovative work behaviour, on the one hand, is related to co-production (Lusch and Vargo, 2008; Dollinger et al., 2018; Dziewanowska, 2018), value-in-use (Lusch and Vargo, 2008; Dollinger et al., 2018; Dziewanowska, 2018), student benefits (Lusch and Vargo, 2008; Penttilä and Kairisto-Mertanene, 2012; Dollinger et al., 2018; Dziewanowska, 2018) and competence (Penttilä and Kairisto-Mertanene, 2012) aspects on the other.

Social value is considered as an important value when business transactions take place, leading to value capture, while others have used the economic dimension to define value creation in business transactions, leading to creation of value (Santos and Zen, 2022).	Strobl et al. (2018) operationalised individual innovation behaviour as an independent variable influencing exploration and exploitation. Waheed et al. (2022) operationalised innovative work behaviour as a mediator in their research on work engagement and organisation performance in the context of manufacturing industries. Al-shami et al. (2023) conceptualised organisational innovative culture as an innovative behaioural construct, moderating between happiness at the workplace and innovative work behaviour on the one hand, and between happiness at the workplace and organisation citizenship behaviour on the other.
Vargo et al. (2008), state that there have to be two actors in the value creation process, for instance, the seller and the customer. The value created for each could be different. Vargo et al. (2008) suggest that for a company, the value created is the exchange value, or value-in-exchange, whereas for the customer it is the 'use value', or value-in-use, that is relevant.	Hartog (2010) argue that individual innovation behaviour is all about idea generation, development of new products and services or processes, improvements in the existing processes used at the workplace, and re-organising and combining current thinking related to problem solving. Other researchers argue that innovation behaviour is concerned with ideas, processes, products, and procedures that are new, novel and worth adoption in organisations (Scott and Bruce, 1994; de Jong and den Hartog, 2010).
Value creation occurs by the customers, for the customers, and that the firm only facilitates such value creation (Grönroos, 2008).	Innovation competence contributes to innovation behaviour (Özbağ, 2013; Charosky and Bragós, 2021). Critical thinking, teamwork, analytical competences, problem solving, creativity, communication &

Student experience and personalised education services acquired by the students, in the form of the student-lecturer relationship, can be considered as part of the value created for the student. This is one form of value-in-use. As such, where HEIs are concerned, relevant values created will include student satisfaction and loyalty (Prebensen et al., 2016; Leem, 2021). Insofar as the product is concerned, it is possible that value is created through the concepts of value-in-exchange and value-in-use (Leem, 2021).	negotiation competences, and intercultural competences form part of the main concept of innovation competency skill (McPhillips et al., 2022), individual competency skills, interpersonal competency skills and networking competency skills (Watts et al., 2013; 2014).

Table 2.2: Distinction between value creation and innovation/innovation behaviour

The distinction between innovation or innovation behaviour on the one hand, and value creation on the other is provided in table 2.2 which indicates that innovation is more of a behaviroural attribute of an employee or a student, while value creation is found to lead to innovation or innovation behaviour. This indicates that value created is evidenced by generating the innovation behavioural attribute in students. Value as a concept can therefore be said to be created if innovation behaviour is developed in an individual, for instance, the student by the professor in a classroom setting.

2.5. Value Co-creation and Higher Education

There is no universal definition of value co-creation that can be uniformly applied in the context of higher education. Before scrutinising the higher education context, it is useful to understand how value co-creation is described in the literature in order to better be able to examine and understand its manifestation in HEIs. Researchers (Prahalad and Ramaswamy, 2004b; Etgar, 2008; Payne et al., 2008) describe value co-creation as a process in which a customer and an end user could be involved as participants in the design and development of personalised products, services and experiences. Grönroos and Gummerus (2014) go further and explain that co-creation of value is a process in which customers have the nodal role while interacting with a company's product or service. Vargo et al., (2008) hold that value co-creation is the process of integration of the available resources of the firm with the resources of the customer. The customers are considered as an operant resource, through their knowledge, skills, and competencies. For this reason, Vargo and Lusch prefer to use the term customer, rather than consumer, for the connotations associated with each term, whereby consumer may suggest a user who consumes value only. They argue that co-creation leads to benefits and welfare of all parties involved in the process. Fan and Luo (2020)

argue that value co-creation is a process that must always focus on the participation of customers, employees, enterprises and other stakeholders leading to an understanding of the demand that is conducive to the realisation of the strategy of an enterprise. These definitions, although varied and complex, have two entities, namely customers and service providers, as common components when describing the value co-creation process. Examples of potential value co-created in the educational context are tabulated in table 2.3.

Value Types	Description/Example	Author(s)
Functional value	Perceived usefulness and/or utilitarian attributes, such as reliability, durability and price.	Costa (2007), Costa, Soares and Brasileiro (2007), Costa (2009), Costa and Mota (2008), Costa et al., (2008), Costa and Oliveira (2008), Brambilla (2016)
Social value	Social association with groups and with social image.	
Emotional value	Feelings towards the possibilities and/or alternatives such as comfort or association with a past time in life.	
Epistemic value	Related to the awakening of curiosity, novelty or knowledge, as it is the case in new situations, in curiosity and in the desire to learn.	
Conditional value	Related to the set of specific situations of the decisive moment of particularities/peculiarities.	
Value-in-use	The concept of value is used to measure a benefit received, and, in this context, the value-in-use is related to work (in the broad sense) required to achieve this improvement.	Vargo (2007)
Transactional value (Nominal value)	The tuition paid by the student (that is the price).	

Table 2.3: List of possible co-created values in the higher educational context

There has been considerable interest amongst researchers on the topic of value co-creation, as purported to occur in higher education institutions (Nguyen et al., 2021; Kutz et al., 2022). Since the term value co-creation came into widespread use in 2004 (Vargo and Lusch, 2004) at which point a definition was proposed by Vargo and Lusch (2004), a new stream of literature that investigates the phenomenon of value co-creation took off vis-à-vis the context of higher education and other sectors as well. Higher education, in particular, was identified as a sector where value co-creation is said to occur commonly between students and other stakeholders, however, contradictions exist (Galpin et al., 2022). For example, Murphy et al., (2017) claim that although there are reported benefits (value) in staff-student co-creation process, it is not common practice in higher education institutions to co-create value. One reason for this may be due to the lack of available models available to operationalise co-creation in HEIs. Co-creation practices tend to exist

in the form of discrete projects rather than institution-wide approaches (Galpin et al., 2022). Moreover, there are tensions that further complicate the adoption of such practices, such as confusion in the minds of stakeholders as to the meaning of universities today (Taylor and Judson, 2011). Students as customers, but not knowledge (co)creators, and the commercialisation of higher education (van't Land et al, 2021) are serious concerns that need to be addressed. Harkavy (2021) argues that these tensions are having a devastating effect on the values and aspirations of students, and that there is an urgent need to address those concerns. Extant literature suggests that one of the ways by which these tensions could be addressed is co-creation (Johnston and Ryan, 2022). However, the process of value co-creation is not free from limitations and criticism. In fact, it is still under-researched, leading to its lack of adoption as mentioned above. The criticisms and lack of adoption are critically reviewed in the next section.

2.5.1. Benefits and Barriers to Value Co-creation in a Higher Education Context

As previously stated, the literature indicates that value co-creation, as a concept, is found to occur in the higher education context. Value co-creation is presumed to generate benefits for multiple actors involved in the co-creation process (Vargo and Lusch, 2016). Nevertheless, there are certain barriers to the occurrence of value co-creation in the context of various institutions including higher education institutions (Edelmann et al., 2022). The benefits that could accrue to students include the following (Zarandi et al., 2022):

Benefits	Author(s)	Barriers	Author(s)
Improvement in the persistence levels of students	Bond (2020)	Feeling uneasy in some partnership relationships	Cook-Sather and Luz (2015), Mercer-Mapstone et al. (2017)
Improvement in the achievements of those students	Bond (2020)	Experience role unsureness	Lizzio and Wilson (2009)
Improving learning skills	Bryson (2016)	Uncertainty regarding possible contribution	Bovill et al. (2011)
Enjoyment and enthusiasm	Hounsell et al. (2007), Bovill et al. (2011), Hussain (2012), Bovill (2013, 2014), Celuch (2018), Dollinger and Lodge (2019), Muramalla et al. (2019), Sahi et al. (2019), Ho (2020); Sanina et al. (2020)	Lack of time	Bovill et al. (2011)

Enjoyment of social value	Hau and Thuy (2016), Ciasullo et al. (2020)	The question of assessment	Meer and Chapman (2014)
Deeper understanding of subject	Bovill et al. (2011), Bovill, (2014), Dollinger and Lodge (2019), Sahi et al. (2019), Sanina et al. (2020)		
Self-awareness and self-efficacy	Luckiger et al. (2010), Ghinea (2013); Pinar et al. (2011), Bovill (2013), Jackson (2015), Crough et al. (2019), Dollinger and Lodge (2019), Sanina et al. (2020)	Power imbalances	Mercer-Mapstone et al. (2017)
Better opportunities in the labour market	Bovill et al. (2011), Bergmark and Westman (2016), Cavallone et al. (2020), Ruskin and Bilous (2020), Sanina et al. (2020)		

Table 2.4: Student related benefits and barriers concerning value co-creation in higher education context (Source: Zarandi et al., 2022; p. 11-13)

Table 2.4 clearly illustrates the importance of value co-creation in the higher education context. The table is significant to this research as it also shows the barriers that could exist in the context of the higher education institutions that need to be overcome in order to allow value co-creation to occur. The next table (2.5) provides an illustration of the benefits that accrue to and barriers that exist in a higher education context as viewed from the HEI's perspective.

Benefits	Author(s)	Barriers	Author(s)
Perceived co-creation benefits: pedagogical, reputational, brand love and positive word-of-mouth regarding the curriculum design process.	Bovill (2014), Ribes-Giner et al. (2016), Sahi et al. (2019)	Possible risks caused by performance of tasks poorly by unskilled customers.	Chen et al. (2010), Bouta et al. (2012), Rashid and Asghar (2016), Pöyry-Lassila et al. (2017), Alioon and Delialioğlu (2019)
Creation of emotional bonds with the institutions and its brand.	Zarandi et al. (2022)	Possibility of social stigma being attached to students when performing certain tasks.	
Participating in brand building by close student involvement with the institution and providing positive feedback.		Possibility of students getting exposed to opportunism by partners associated in the co-creation process.	
Enhanced teaching and classroom experiences.			
Increased meta-cognitive awareness.	Bryson (2016), Muramalla and Alqahtanib (2019)	Some tasks may require physical effort causing concern for some older students or those with health issues.	
A more robust sense of identity.			
Improved student-staff relationships.		Some students may guard against the psychological effort implied in the co-creation act while making decisions, learning new skills, and searching for information in an active way.	
Implementation of a series of graduate attributes.			
Positive impact on relational outcomes concerning e.g., student retention, student commitment and students' positive word-of-mouth caused by student orientation.	Robinson and Celuch (2016)	In getting involved in the co-creation process there could be some need for students to make certain adjustments both culturally and behaviourally.	Kelley et al. (1990), Etgar (2008), Junco (2012), Salaber (2014), Monavvarifard et al. (2019)
Achieve better global market positioning and differentiating from amongst competing institutions using online platforms for student co-creation.	Hasan and Rahman (2016), Celuch et al. (2018)		

Continuous co-creation of procedures occurring due to the involvement of the resources and actions of the students to learning environments and platforms.	Zarandi et al. (2022)		
Engagement of students in solving problems to derive stronger business relationships and minimise risk as well as getting feedback from the students.	Roberts and Alpert (2010), Gibbs and Kharouf (2020)		
Student loyalty, university image, and student university identification.	Dollinger et al. (2018)		
Participation of the students in the activities of a university to make the services better and enhance marketing activities of the university.	Fluckiger et al. (2010), Fagerstrøm and Ghinea (2013)		
Boost university brand survival.	Azoury et al. (2014), Sahi et al. (2019)		
Increased market acceptance of universities through social co-creation processes achieved through online collaborations.	Hoyer et al. (2010)		

Table 2.5: Benefits of and barriers affecting value co-creation related to higher education institutions (Source: Zarandi et al., 2022; p. 10-11)

2.5.2. Criticism of Value Co-creation in a Higher Education Context

Jain et al. (2022) found that value co-creation is a process that can have negative consequences and cannot be taught. Jain et al., (2022) also found that higher education institutions are complex systems and there can be instances when marketing can challenge the academic dignity. Furthermore, Gronroos (2011) posited that much of the literature that has discussed value co-creation has invariably used the concept based on the conception of service-dominant logic, proposed by Vargo and Lusch (2008), without any criticism. For instance, Gronroos (2011) argued that the description of value co-creation does not clearly answer questions including what value co-creation and value creation are, what are the elements that constitute value co-creation and creation, and what theoretical and practical aspects can be understood through the description. Whilst other researchers raise the issue of identification of the entities that co-create value, as multiple views exist in the literature. For example, Attar et al. (2022) argued that when customers interact with s-commerce (social commerce) platforms value is created. This implies that the current understanding of creation of value, and how and when it occurs could be flawed.

To better understand the concept of value co-creation, this review critically investigates three aspects, namely the conceptualisation of value co-creation, the factors that could be involved in the process of co-creation, and the theories relevant to the explication of value co-creation. Concomitantly, while reviewing the relevant literature in a critical manner, the chapter also highlights the gaps that exist in the literature with a particular focus on the education sector.

2.6. Conceptualisation of Value Co-creation

Various researchers have conceptualised value co-creation in different ways. The earliest conceptualisation was provided by Prahalad and Ramaswamy (2000) in their seminal work that discussed coopting customer competence to co-create personalised experiences and thus value. They elaborated on the transformation of the customer (role), from passive to active, whereby the customer is no longer just a consumer of value, but in fact the main (co)creator. This re-conceptualisation of the role of the consumer was the starting point, and the crux of the matter. With the advent of web 2.0, bringing about new fora and platforms for consumers to meet and engage with sellers and firms, a paradigm shift had entered the equation paving the way for such new perspectives on the role(s) of consumers beyond mere consumption and destruction of value (Askegaard and Linnet, 2011). Technological developments created new tools for consumers to engage with firms in an active interaction characterised by low barriers, whether these barriers be effort, geographical distance, time, or other. Increasing competition, spurred by the waning significance of national and geographical boundaries, which is part and parcel of globalisation, has spoiled consumers for choice, and forced firms to find new ways to differentiate. All these developments have built up towards, and informed, the new re-conceptualisation of 'consumers', to an extent such that the term consumers may no longer be viewed as appropriate lexicon given its reductionist and limiting nature. Vargo and Lusch (2004) similarly argued for the changing roles of the customers, and furthered this by conceptualisating customers as operant resources that the firm must utilise, by combining customer knowledge and skills in any co-creation process, although Prahalad and Ramaswamy (2000) recognised this as being a difficult task. Prahalad and Ramaswamy (2004a) refined their conceptualisation of value co-creation further still with their introduction of the DART model, which provided a basis to understand the concept in a more meaningful and practicable way. A set of examples have been provided by Prahalad and Ramaswamy (2004b) to understand what could be considered as creation and what could not be, and those examples have been tabulated in table 2.6.

WHAT CO-CREATION IS NOT	WHAT CO-CREATION IS
• Customer focus • Customer is king or customer is always right	• Co-creation is about *joint* creation of value by the company and the customer. It is not the firm trying to please the customer
• Delivering good customer service or pampering the customer with lavish customer service	• Allowing the customer to co-construct the service experience to suit her context
• Mass customization of offerings that suit the industry's supply chain	• Joint problem definition and problem solving
• Transfer of activities from the firm to the customer as in self-service • Customer as product manager or co-designing products and services	• Creating an experience environment in which consumers can have active dialogue and co-construct personalized experiences; product may be the same (e.g., Lego Mindstorms) but customers can construct different experiences
• Product variety	• Experience variety
• Segment of one	• Experience of one
• Meticulous Market research	• Experiencing the business as consumers do in real time • Continuous dialogue
• Staging experiences	• Co-constructing personalized experiences
• Demand-side innovation for new products and services	• Innovating experience environments for new co-creation experiences

Table 2.6: Examples of what is considered as co-creation and what is not
(Source: Prahalad and Ramaswamy, 2004b)

The initial discourse surrounding co-creation and value co-creation centred on the customer as the sole creator of value, with the focus being on the marketing sector. Vargo and Lusch (2004), for instance, argued that economic activity occurs through service dominance – not a goods dominance - in the process of all economic exchange. From there on, the new theory of service-dominant logic (S-D logic) was formulated which contested the economic theory which relied on by the goods-dominant logic (G-D logic). The discourse started to shift towards a service dominant logic in place of the traditional goods dominance logic. Although Vargo and Lusch (2004) were successful in pointing out the need to reconsider the economics theory-based G-D logic, the concept of co-creation was still opaque and lacking in clarity. Arguing along the same lines as that of Vargo and Lusch (2004), Prahalad and Ramaswamy (2004) independently proffered the concept of co-creation as being based on service centered exchange. They held that interactions, in their aggregate, constitute and create unique experiences for the customers, and that there

needs to be a shift from firm or product-centric to customer centric views in which the customer is more than a mere consumer. Economics-based theories were deemed both insufficient and inadequate to explain the concept of co-creation, as a customer-centric relational view is inherent to the concept itself. The importance of the unique customer experiences suggests the relevance of the experience economy theory, which is discussed later in the theories section.

Both the seminal works of Vargo and Lusch (2004) on S-D logic, and Prahalad and Ramaswamy (2004b) on co-creation, taken together, have spurred a new stream of literature where researchers started investigating the concept of co-creation using the S-D logic. The first significant attempt at conceptualising value co-creation was done by Prahalad and Ramaswamy (2002) when they discussed the building blocks of co-creation, before introducing the DART model (2004a) as previously stated.

With regard to S-D logic, Vargo and Lusch (2016) published a second update to their original conceptualisation from 2004, tables 2.7 and 2.8 provide a glimpse of the changes incorporated since the original S-D logic.

FPs	Original foundational premise	Modified/new foundational premise	Comment/explanation
FP1	The application of specialized skill(s) and knowledge is the fundamental unit of exchange	**Service** is the fundamental **basis** of exchange	The application of operant resources (knowledge and skills), "service," as defined in S-D logic, is the basis for all exchange. Service is exchanged for service
FP2	Indirect exchange masks the fundamental unit of exchange	Indirect exchange masks the fundamental **basis** of exchange	Because service is provided through complex combinations of goods, money, and institutions, the service basis of exchange is not always apparent
FP3	Goods are a distribution mechanism for service provision	Goods are a distribution mechanism for service provision	Goods (both durable and non-durable) derive their value through use – the service they provide
FP4	Knowledge is the fundamental source of competitive advantage	**Operant resources are** the fundamental source of competitive advantage	The comparative ability to cause desired change drives competition
FP5	All economies are services economies	All economies are **service** economies	Service (singular) is only now becoming more apparent with increased specialization and outsourcing
FP6	The customer is always a co-producer	The customer is always a **co-creator** of value	Implies value creation is interactional
FP7	The enterprise can only make value propositions	The enterprise **cannot deliver value, but** only offer value propositions	Enterprises can offer their applied resources for value creation and collaboratively (interactively) create value following acceptance of value propositions, but can not create and/or deliver value independently
FP8	A service-centered view is customer oriented and relational	A service-centered view is **inherently** customer oriented and relational	Because service is defined in terms of customer-determined benefit and co-created it is inherently customer oriented and relational
FP9	Organizations exist to integrate and transform microspecialized competences into complex services that are demanded in the marketplace	**All social and economic actors are resource integrators**	Implies the context of value creation is networks of networks (resource integrators)
FP10		**Value is always uniquely and phenomenologically determined by the beneficiary**	Value is idiosyncratic, experiential, contextual, and meaning laden

Table 2.7: Modifications introduced to the original S-D logic by Vargo and Lusch (2008)

Foundational Premise	2004	2008	Update
FP1	The application of specialized skills and knowledge is the fundamental unit of exchange.	Service is the fundamental basis of exchange	No Change AXIOM STATUS
FP2	Indirect exchange masks the fundamental unit of exchange.	Indirect exchange masks the fundamental basis of exchange.	No Change
FP3	Goods are distribution mechanisms for service provision.	No Change	No Change
FP4	Knowledge is the fundamental source of competitive advantage.	Operant resources are the fundamental source of competitive advantage.	Operant resources are the fundamental source of strategic benefit.
FP5	All economies are service economies.	No Change	No Change
FP6	The customer is always the co-producer.	The customer is always a co-creator of value.	Value is cocreated by multiple actors, always including the beneficiary. AXIOM STATUS
FP7	The enterprise can only make value propositions.	The enterprise cannot deliver value, but only offer value propositions.	Actors cannot deliver value but can participate in the creation and offering of value propositions.
FP8	Service-centered view is customer oriented and relational.	A service-centered view is inherently customer oriented and relational.	A service-centered view is inherently beneficiary oriented and relational.
FP9		All social and economic actors are resource integrators.	No change AXIOM STATUS
FP10		Value is always uniquely and phenomenologically determined by the beneficiary.	No change AXIOM STATUS
FP11			New Value cocreation is coordinated through actor-generated institutions and institutional arrangements. AXIOM STATUS

Table 2.8: Second update of the S-D logic by Vargo and Lusch (2016)

A key observation from the literature is the fact that the conceptualisations introduced by Vargo and Lusch (2016) and Prahalad and Ramaswamy (2004b) have not been empirically tested by the authors themselves. Numerous other authors have, however, attempted to produce empirical models based on S-D logic and the concepts postulated by Prahalad and Ramaswamy (2004b), although many aspects of co-creation remain under-explored (Pham et al., 2022). For example, Leem (2021) investigated the creation of value in the context of higher education, and applied the concepts of S-D logic, and co-creation, to understand the relationship between value co-creation and student benefits using a quantitative research method. A similar exercise was carried out by Díaz-Méndez and Gummesson (2012) who investigated value co-creation and university teaching quality through a case study where they applied S-D logic and co-creation concepts. Similar efforts can be seen vis-à-vis research efforts undertaken by Byon et al. (2022), Nguyen et al. (2021), Chatterjee et al. (2021), and Kopelyan (2016).

S-D logic garnered a lot of attention in recent years. Some researchers, such as Grönroos (2011), question the robustness of S-D logic and assert that the foundational concepts of S-D logic needed further examination. In the seminal work carried out by Grönroos (2011) the conclusions drawn by the author show

that six of the ten basic statements defining the S-D logic were reformulated. This implies that the reformulated S-D logic statements need to be researched further, but empirical research that have used the reformulated S-D logic suggested by Grönroos (2011) is yet to be conducted. Furthermore, research efforts in the field of higher education that have applied S-D logic are recent (Cho et al., 2020; Dollinger and Lodge, 2018; Dziewanowska, 2018). Consequently, it is reasonable to infer that the current understanding of the co-created value in the higher education institution context suffers due to a lack of empirical evidence.

Additionally, and as alluded to previously, the earliest conceptualisation of co-creation began with the seminal works of Prahalad and Ramaswamy (2002; 2004a) where they identified four main components as constituting the concept, or process, of co-creation, namely, dialogue, access, risk assessment and transparency – the DART model. However, the earlier works on the streams of relationship marketing, experiential marketing, and branding, covering critical concepts such as customer relationship management, brand image, and brand identity, may be argued as being the foundations upon which the more contemporary conceptualisations of value co-creation has been built. The literature, going back to more than a quarter of a century ago (Boyle, 2007) discussed the importance of customer relationship management, and branding, whereby the firm's relationship with the customer was recognised for its importance (i.e., customer equity). Further still, the customer's relationship with the firm, or brand to be exact, was also recognised as an important driver of customer loyalty. It became widely recognised that customers can – and should - develop their own personal relationships with products via brands. In an attempt at conceptualising the process of co-creation, within a branding context, Boyle (2007) argued that there are two main actors that drive the process of co-creation, namely firm and consumers. In her paper (2007), she observes that there are five (5) main stages of co-creation that start from the pre-consumption stages, which are primarily firm-driven, to the post-consumption stages, which are consumer-driven. Whereas Payne et al. (2008) argued that co-creation is a process that needs to be viewed from the perspective of suppliers and comprises the customer value creation process, encounter process and supplier value creation process. The authors were concerned with the lack of understanding surrounding how customers engage in such value co-creation. In contrast to the preceding conceptualisations and understanding, they posited that customers determine value only when the good or service is concerned. This view glaringly neglects the pre-consumption stage, the value-added approach, whereby value is not seen as a static and discrete concept, but one that can be (co)created and maximised at various stages of co-creation, including the pre-consumption stage, via co-production for instance. The authors do allude to co-production, but do so only in passing, after which the concept is largely dismissed due to its 'tainted' nature insofar as the supposed connotations with G-D logic. Gronröos (2011) viewed the co-creation process differently and explained that it consists of three processes, namely, value promotion, value co-creation,

and separate creation. Wikström (1996) claimed that a central aspect of the value creation process is value co-production, which occurs through deep interactions between the seller and the buyer. Such interaction, when the customer assumes the role of co-producer, can lead to more value when compared to a mere transaction-based interaction. In the same vein, Bettencourt (1997) argued that customers are one example of possible co-producers.

Fan and Luo (2020) explain that research efforts on value co-creation are found to generally cover three main areas, namely, customer participation, joint value creation, and the impact of value creation. They go on to assert that participation of customers in the value co-creation process primarily occurs due to the psychological motivation and personal characteristics of customers. Whereas research on joint value creation focuses on the 'how' question, and may be trifurcated into role research, process research, and management problem research. The third area on impact of co-creation centres on creativity and innovation. Within and across these three areas, the research on value co-creation has been conducted in a multiplicity of settings, with different foci which are contingent on the context. However, there is a common thread in all the research, whereby the literature on co-creation will always invariably tackle – whether directly or indirectly – the issues of enhanced value creation, enhanced engagement, and creativity (Durall et al., 2009). These issues are inherent to co-creative activities, therefore value co-creation research. Nevertheless, research efforts have produced different research outcomes implying the existence of contradictions in value co-creation research, and the need for more empirical evidence (Fan and Luo, 2020).

Furthermore, the literature points towards the widespread reliance on, and application of, the service-dominant logic theory when exploring the concept of value co-creation, and that innovation is part of such value co-creation (Fan and Luo, 2020; Nguyen et al., 2021). Moreover, the researchers examining value co-creation in a higher education context argue that value co-creation could be better explained when viewed through the lens of service-dominant logic.

The process of co-creation has been investigated via research on a multiplicity of aspects and dimensions, including co-design (Kunneman et al., 2022), co-production, co-patenting, co-ownership (Josè et al., 2021), co-experience, co-definition, and co-development (Ketonen-Oksi and Valkokari, 2019). In addition, several values have been identified by researchers as being produced during the co-creation process in the higher education context. Such values include functional, emotional, social, epistemic, conditional, exchange and transactional value. Furthermore, value-in-use, nominal value and real value are also considered by researchers while examining the concept of value co-creation (Brambilla, 2016). However, it is not clear in the literature what is the exact value that is being created, and how is it created, in the co-creation process

which points to an important gap in the literature (Abrantes et al., 2007, p. 960). For instance, in the context of higher education, where students are one of the main actors in the value co-creation process, the role of innovation is not clear. It is further stated by Abrantes et al. (2007) that there are many difficulties in measuring the value outcome in the education sector, and that there is no consensus amongst researchers on the factors that mainly influence the effectiveness of teaching and learning, which according to Brambilla (2016) indicates a lack of clarity on how co-creation occurs in the classroom.

Much of the literature concerning the conceptualisation of value co-creation revolves around concepts like co-production of value, co-design of value, value-in use, co-innovation, perceived benefits, innovation behaviour, customer experience, customer satisfaction and image of the organisation (Fan and Luo, 2020; Nguyen et al., 2021; Saha et al., 2022). Some researchers have conceptualised value co-creation as a construct that acts as a determinant. For instance, Nguyen et al. (2021) conceptualised value co-creation as an independent variable driving student satisfaction in the context of higher education marketing. Dziewanowska (2018) conceived a model where value co-creation as a determinant of co-production, experience and relations while studying the value co-creation styles in higher education and their consequences. However, Vargo et al. (2008) argued that value co-creation is driven by value-in-use. Similarly, Ingram et al. (2016) argue that co-creation is part of the co-innovation process. Although the conceptual refinements in the literature point towards co-creation being a superordinate concept that encompasses several other concepts and processes such as co-production and value-in-use, there remains a conflation of some of these terms in the literature, where concepts such as co-design, co-creation and co-production are still used interchangeably (Brandsen and Honingh, 2018). The literature also demonstrates examples wherein the concept of value co-creation has been used as dependent variable (Leem, 2021; Jiang et al., 2022; Liang et al., 2022). While these examples show that value co-creation has been found to be conceptualised both as an independent and dependent variable in research, there are other instances in which value co-creation has been constructed as a mediating variable (Jebarajakirthy et al., 2021; Moonti et al., 2023; Rahayu, 2023). However, the treatment of value co-creation as a moderating variable is not very much evidenced in the literature.

The literature provides evidence to suggest that many variables can contribute to value co-creation, with some researchers having attempted to conceive a holistic model. This implies that many different concepts can be used to represent value co-creation. For instance, Fusco et al. (2023) developed a value co-creation framework in the healthcare context where the outcomes produced as co-created value included customer satisfaction, perceived value, quality of care, health status, well-being, quality of life, learning, co-production intention, empowerment and the resulting psychological benefits, behavioural changes,

cost/time saving and drawbacks (e.g. pressure and stigma). Similarly, Vargo et al. (2008) presented a framework of value co-creation where the main outcome was shown to be value-in-use. The preceding arguments clearly point to the fact that conceptualisation of value co-creation has been multifold, and there is no consensus amongst researchers as to a unique representation of value co-creation, despite the calls for more comprehensive and holistic frameworks (Payne et al., 2008). Understanding this reality is deemed critical, as it provides impetus for the study of value co-creation, whether as a dependent variable, independent variable, or even as a mediating variable. Furthermore, it is also incumbent that value co-creation could be studied under environments in which constructs representing value co-creation could be conceptualised in various ways. Variables leading to the development of theoretical frameworks could be used to study value co-creation and associated phenomena to understand how, or to what extent, value is co-created under various contexts.

2.7. Theories used in Value Co-creation Research

Numerous theories have been proposed and applied in research concerning value creation and co-creation. Value co-creation literature indicates that S-D logic, self-determination theory, experience economy theory, social capital theory, innovation behaviour theory, theory of co-production and social exchange theory have been used to explicate and investigating various concepts (Saha et al., 2022). The literature review contained in this research project will provide relevant literature concerning all the theories mentioned, with a particular focus on S-D logic as the main theory this research relies on. The remaining theories are discussed in the following section, and then referenced again where concepts are discussed later in the chapter.

2.7.1. Service-Dominant (S-D) Logic Theory

The service-dominant logic emerged as a meta-theoretical stream of research during the early part of the first decade of the new millennium. It came as a natural evolution to the development of service marketing as a sub-discipline, and as part of a growing recognition of the limitations of extant conceptualisations of services, goods, value, and other related but nevertheless critical concepts (Vargo and Lusch, 2004). S-D logic was first introduced by Vargo and Lusch in 2004, as an alternative theoretical approach to explicating the processes of exchange and value creation within a network of actors, and a constellation of relationships. S-D logic represents an articulation of the evolution of a new worldview, or a paradigm shift in marketing, away from the prevalent goods-centric ways of thinking that dominated mainstream literature in the field of marketing. Marketing inherited many of its concepts from various disciplines, most notably economics, which led to an industrial bias and a goods-centric paradigm that viewed goods and services as a dichotomy of sorts (Vargo et al., 2010).

Vargo and Lusch (2004) articulated the paradigm shift by proffering S-D logic as being built on a set of 8 foundational premises (FPs) and have since then developed these premises to encompass 11 FPs (Vargo and Lusch, 2017). In their early work on S-D logic, Vargo and Lusch (2004) discussed the concept of resources in depth, its evolution, and more recently, its bifurcated conceptualisation where resources may be classified as being either operand or operant. The former classification holds that such operand resources are resources that are acted upon, in order to derive a certain effect or utility, whereas the latter holds that resources can also be operant, meaning that such resources in-and-of-themselves may produce certain effects and thus utility. The importance in recognising such a duality lies in the recognition of intangible resources as being key inputs in the 'production' process. In the same vein, Payne et al. (2009) posit that S-D logic shifts the attention of value creation from tangible to intangible assets, for instance abilities of people, knowledge and processes. This shift, or distinction, allowed for the appreciation of the role of productive resources, and that skills and knowledge are amongst the most important of resources. Further yet, the value of such resources lies in their application, as they act and are applied on other resources.

Vargo and Lusch (2004) subscribed to the view that value, as utility, transcended the physical good. This meant that goods were simply viewed as a distribution mechanism, or a vehicle for delivery of value, whereby the good is a transmitter of operant resources, insofar as it is a manifestation of the skills, knowledge, and labour applied (Lusch and Vargo, 2006). This view represented a departure from the prevailing views of the time, insofar as they had conceptually inverted the relationship between goods and services, where services were now considered superordinate to goods. Such an inverted conceptualisation necessitated the reevaluation and reframing of the lens with which the whole matter was being viewed, where the locus of the conceptual tensions lay. This conceptual inversion spurred a further set of conceptual adjustments. Firstly, people, or customers to be specific, engaged in exchange relationships for the benefit, or utility, derived from the application of operant resources, and 'bundles of skills and knowledge' (also known as competencies). The tangible good itself is a mere medium of transfer or transmission. As such, the exchange relationship was reconceptualised, with the primary unit of exchange adjusted in the emerging service-centred dominant logic (Vargo and Lusch 2004). Furthermore, value itself was not determined by the producer, as the production process was not restricted to a single producer (i.e. the firm), but rather, value is determined by the customer as the co-creator and consumer of such value. Therefore, the view of 'exchange-value' was superseded by the more meaningful and apt 'value-in-use'.

In redefining the nature of the relationship between the customer and the firm, where the unit of exchange is no longer the good itself, a re-examination of the role of both the customer and the firm becomes imperative. This redefinition of the roles of customers is akin to the reconceptualisation that appears in the

seminal works of Prahalad and Ramaswamy (2000; 2004a). In recognising that the customer is a co-creator of value, and that value is necessarily determined by the customer, and not the firm, the old view and understanding of the nature of the customer (and the firm) is rendered suspect and conceptually limited. As such, Vargo and Lusch (2004) expand the concept of operant resources to include the customers themselves, where the customer is primarily an operant resource, through inherent involvement in the creation of value. Vargo et al. (2010) proffer the primacy of operant resources over operand resources and posit that such operant resources are the basis for S-D logic, as captured in FP1, "*Service is the fundamental basis for exchange*" which is later afforded axiom status. A view of customers as operant resources adds to the coherence of the new perspective of relationships, and the need to transcend the limited view of transactions, where a monetized exchange of goods characterises the relationship. Given the shift towards a continuous-process (value creation) perspective, a view of the relationship in terms of an exchange of skills-for-skills, or services-for-services, becomes more appropriate and meaningful. The goods-centric view is thus superseded by a service-centric view, as the tangible product is no longer a central focus of the relationship, nor the point of intersection of the customer and the firm. That view is a remnant of the industrial revolution, and in the emerging S-D logic, the tangible product is a special case of the superordinate concept of service.

In their subsequent works, Lusch and Vargo (2006) address some lexicon issues and misinterpretations vis-à-vis S-D logic, where they set out to further articulate the process-orientation of S-D logic. They differentiate between the use of the singular 'service' and the plural 'services', where the focus of S-D logic is on the former, denoting a process of value creation, as opposed to the latter, which denotes a unit of output.

Further revisions and refinements of the lexicon continued as evident by Vargo and Lusch (2008; 2016; 2017), where some of the FPs were re-articulated. The finetuning of the language of the FPs was done with a view that a continued evolution of the concepts, away from G-D logic loaded terms, was necessary in such a way that "*application must be firm (or customer, or societal, etc.) centric, [whereas] understanding should be market-centric*" (Vargo and Lusch, 2008, p.3).

In an effort to consolidate understanding further, as previously discussed, Vargo and Lusch introduced a set of axioms (Table 2.8), together with their final FP (11). The new foundational premise (FP11), "*Value cocreation is coordinated through actor-generated institutions and institutional arrangement,*" is meant to clarify the process orientation whilst simultaneously shedding light on the concept and role of service ecosystems as part and parcel to the understanding of S-D logic (2016). The usage of the term 'actor' in this new foundational premise reaffirms the importance of distinguishing between the nature and

dissimilarity of these economic actors, in a departure from the G-D logic terms of 'producer' and 'consumer'. Furthermore, the term 'actor' serves to facilitate the understanding of the complex relationships, interactions, and intersections of the different players in the value co-creation process in a way that is most consistent with a systems orientation, given the dynamism involved within a framework of coordinated actions and arrangements.

Although a purely dyadic view of S-D logic is arguably inadequate, when considering the implications of S-D logic wholesale, as value co-creation occurs through multi-actor phenomena where there is a set of relationships that may overlap and occur on a massive scale, nevertheless, the customer remains the central actor in this process as recognised and articulated in FP6. This was first stated as "*The customer is always the co-producer*", which was later modified to "*The customer is always a cocreator of value.*" The purpose of this modification was to establish value co-creation as the central function worthy of attention and investigation, away from the G-D logic term 'co-producer' which, although still relevant, is a subordinate concept which has the potential to misdirect attention and understanding towards less important concepts such as services in terms of units of out/production, rather than service as a process. Moreover, Vargo and Lusch's presuppositions related to co-production being an optional component of co-creation come in contradistinction to Osborne et al. (2018) who argue that co-production is an inalienable process that necessarily occurs (Osborne and Strokosh, 2013). The foundational premise was modified and finetuned, yet again, where it became "*Value is cocreated by multiple actors, always including the beneficiary.*" The need for another modification, still, came due to the confusion of some who interpreted the FP as suggesting that the customer is the only actor involved in co-creation or value, or that the co-creation of value only occurred in dyadic relationships involving the customer. As such, the customer was replaced with the term 'beneficiary', however, the key role of the customer remains, and is still manifest in the new form of FP6, and more clearly captured in FP8 and FP10. Such an understanding of the evolution and development of these FPs is crucial towards understanding the role of the customer as being central to the co-creation of value, whilst guarding against misinterpretation and misconstrual of the true and precise intent of the FPs.

Furthermore, S-D logic theory states that the firm and the customer are interconnected in executing their roles in the value creation process, and are not distinct and separate (Yu et al., 2019). The modified version of S-D logic, as discussed earlier, was criticised by Gronröos (2011) who suggested modifications to the six of the ten FPs. However, Prahalad and Ramaswamy (2004) argue that co-creation occurs when there is an interaction between the firm and the customer and customer co-creates value in the interaction process alongside the firm, which is a customer centric activity. This argument can be viewed in contradistinction to S-D logic, insofar as while S-D logic discusses service as the dominant phenomenon that creates value -

not the goods - Prahalad and Ramaswamy (2004) focus on the customer-centric aspect of co-creation as being the central concern. Notwithstanding this difference in the central focus, S-D logic has been applied by many researchers in the field of education (Brambilla, 2016; Leem, 2021; Osorno-Hinojosa et al., 2022), which is the focus of this research. This potentially raises questions around the validity of S-D logic and its applicability in the context of higher education institutions, which future works should regard with care.

As for the application of S-D logic to the co-creation of value in a classroom setting within higher education institutions, such a context requires careful examination due to S-D logic being primarily concerned with and originating from marketing stream. Research on the education sector is not considered to be part of mainstream research in marketing as students are not always accepted as customers (Sharma and Nandi, 2022). However, there are certain aspects that are already known vis-à-vis the relationship between the university and the student. These include the fact that universities need to offer unique and unforgettable student experiences through interaction between the university and the students, to enable the generation of extra value for the students (Leem, 2021). Within this context, Leem (2021) suggests that it is possible for S-D logic to be applied in explaining whether extra value can be generated by introducing a two-way delivery of service between the professors and the students. However, this is done through reliance on a marketing perspective and not an education perspective. Therefore, applying the marketing perspective of S-D logic will require assuming students as consumers, an argument for which there is no consensus within the academia. Nevertheless, in order to consider that there is a possibility to create extra value in the classroom, it is necessary for the university to engage students and tailor educational services. These should have the ability to satisfy the students' specific needs, via the creation of unique experiences, during their career in the university (Leem, 2021). Evidence to support the argument that S-D logic theory can be applied in explicating value co-creation in the university classroom environment through the introduction of a two-way delivery of service that enables students to gain unique experiences throughout their studies in the literature is sparse. Furthermore, unique experiences can be argued as being quality attributes (Masip et al., 2011). This would inform direct observation of students in the classroom in order to adequately ascertain that such unique experiences are in fact being (co)created as part of the extra value generated during classroom interactions. As such, the applicability of S-D logic theory is not well understood for certain contexts, as the literature appears to contain only vague references to suggest that student experiences can be generated as part of co-creation processes, as measured through observations or data collected through semi-structured interviews. For instance, Osorno-Hinojosa et al. (2022) investigated the co-creation of value from the point of view of university–industry collaboration. In their study, they suggest that this will lead to the generation of innovation as student experience, and extra value through the interaction in the university. However, this research effort, by Osorno-Hinojosa et al. (2022), could not conclusively establish

whether it is S-D logic that enabled the authors to demonstrate that value was co-created through the collaborative process between the university and industry – one example of an interactive process that could be chosen for study using the S-D logic. This leads to confusion as to how the application of S-D logic theory can yield an understanding around the way in which unique innovation experiences could be gained by students in the process of industry-collaboration, given the intangibility of experience. Evaluating this is a challenge (Osorno-Hinojosa et al., 2022), and to date remains a gap in the literature. Hence, the universal application of the S-D logic theory to varying contexts could pose a serious problem that requires further investigation.

Additionally, researchers have not applied S-D logic as the only theory with regard to research concerning value co-creation. The literature clearly shows that other theories have been used, including self-determination theory, experience economy theory, social capital theory, theory of co-production and social exchange theory. Furthermore, there are other theories as well that have been used applied by researchers to examine the concept of value co-creation in the education sector. For instance, the practice theory, stakeholder theory, activity theory and marketing theory.

The main purpose of this research is to understand how, and to what extent, value co-creation occurs in the classroom context. Additionally, this research undertakes an investigation of how certain factors are considered important in the creation of extra value for students during the value co-creation process. Therefore, instead of providing a comprehensive discussion on relevant theories in this section, the theories are explained at two stages; in each section concerning the factors reviewed in this chapter. As explained earlier, factors that are widely recognised and applied by researchers that need to be considered when investigating the concept of value co-creation include co-production, value-in-use, innovation behaviour of students, and student benefit(s). Hence, discussion on theories will be included in the review of those factors chosen for study in this research and presented in the following sections.

A key issue that needs to be considered is the trend in which empirical studies are proceeding, and the methodology that is being used in the various studies concerning value co-creation within the context of higher education. Current trends in the investigations related to value co-creation in higher education demonstrate an increasing focus on student co-creation and student benefits accruing from co-creation. For instance, Nguyen et al. (2022) studied the role of students' co-creation behaviour in higher education institutions in Taiwan. Leem (2021) studied the effect of value co-creation on student benefits in the higher education context during the prevalence of COVID-19 pandemic. Nevertheless, the literature shows that the concept of value co-creation in the higher education sector is still a recent development, and that there

remains a dearth of comprehensive conceptual models. In other words, value co-creation in HEIs is still underexplored (Díaz-Méndez and Gummesson, 2012; Elsharnouby, 2015). This implies that one of the reasons why the concept of value creation is underexplored could be that a concept like value co-creation is multifaceted, which may require deeper and wider study in order to elucidate in-depth knowledge about value co-creation using different methodologies.

One important argument that emerges from the previous section is that researchers need to carefully consider the appropriateness and adequacy of research methods applied when studying the concept of co-creation of value by students in the higher education context. A single method approach may not be sufficient to gain a deep, insightful, and adequately nuanced understanding of the concept of value co-creation. A recent study by Saha et al. (2022) observed that the percentage of papers that have adopted qualitative research method is higher (60%) than that of those that have used quantitative (24.3%) and mixed methods (15.7%). There is a lack of adequacy in terms of the number of papers that have objectively investigated the concept of value co-creation, combining both objective and subjective methodologies to understand the concept. For instance, creating unique experiences for a student as an added value cannot be adequately understood by qualitative methods alone. Consequently, there is a clear need to understand, objectively, how the experience has benefited those students. Furthermore, the adoption of mixed methods research could be useful towards elucidating a more comprehensive and holistic understanding of the concept of value co-creation by students. There is an uneven balance of research methods that have been applied to study the concept of value co-creation, leading to the inference that many aspects, and much of the knowledge, about value co-creation might still be hidden and unknown.

2.7.2. Co-production Theory

The roots of co-production, as an idea, trace back to several decades ago, with the first emergence of the term as such appearing in the 1970s (Vincent et al., 2018). In the decades that followed, and throughout the 1980s and 1990s, the use of the idiom and the overt and explicit study of co-production gained popularity (Jasanoff, 2004). According to Ostrom (1996) co-production represents an opportunity for complementary inputs from external actors, such as citizens in a public service context, to be added in a synergistic manner to achieve more effective outcomes. Whilst co-production theory can, at times, seem like a panacea to a myriad of problems related to public service provision (Brix et al., 2017), or private enterprise activities, Ostrom (1996) acknowledges the need for certain conditions to be in place. In the same vein, Jasanoff (2004) recognises the usefulness of co-production, with its applicability to various and numerous contexts, however, she cautions against treating co-production theory as a full-fledged theory. Additionally, many researchers acknowledge the problem of the existence of a multitude of definitions and understandings,

owing to the application of co-production across various contexts and disciplinary traditions (Verschuere et al., 2012; van der Hel, 2016; Miller and Wyborn, 2020).

The literature indicates that a substantial proportion of theorization on co-production has focused on the questions related to the who, what, when and how (Needham and Carr, 2009; Verschuere et al, 2012; Osborne and Strokosch, 2013; Nabatchi et al., 2018; Steiner et al., 2022). Beyond these questions, another theorization of relevance found in the literature concerns the theory of change of co-production, occurring during the various processes and interactions between people, including the value co-creation process. One of the guiding principles in this context was the one proffered by Ostrom (1996) who identifies four conditions that are considered important towards understanding the concept of co-production in comparison to other kinds of production. The four conditions postulated by Ostrom (1996) were crafted with a particular focus on the case of public services. These are as follows:

- When diverse entities and compliments are used as co-production inputs, then there can be synergy (Condition 1).
- During interactions between two parties, options must be available for both parties (Condition 2).
- During interactions between two people, building a credible commitment to each other would lead to a situation wherein when one person increases the input, the second person interacting with the other will continue at the same or higher level of providing input (Condition 3).
- During co-production, it is necessary to assist in encouraging government officials and citizens to provide inputs (Condition 4).

The theory of change is discussed by Gertler et al. (2016) who describe it as focusing on how and why an intervention can be expected to deliver certain desired outcomes. The theory provides insights into the causal logic of how. This theory also acts as a key underpinning of any impact evaluation, where research centres on cause-and-effect as a phenomenon (Gertler et al., 2016).

The postulations discussed above as relevant to co-production theory are varied, and do not provide a common ground to apply across the various interactions amongst stakeholders to explain how co-production can lead to value co-creation. Examples of the application of theory of change of co-production in research are found in the literature. For example, Durose et al. (2017) and Sullivan (2011) argue that theory of change for co-production can be applied to identify important benefits of co-production across various contexts. Similarly, Mannell et al. (2023) conducted an exploratory study in an effort to understand the various methodologies that could be used to gain knowledge on the co-production process in the healthcare context. Mannell et al. (2023) found that co-developing a theory of change is possible in the co-production process.

Brix et al. (2017) utilise change theory to evaluate co-production in their research concerning the effects of co-production initiatives in public service organisations.

As for the limitations of co-production theory and the theory of change of co-production, it is argued that practicality, development, and application of theory of change are issues that arise and must be contended with (Prinsen and Nijhof, 2015). One other limitation of the theory of change is that the representation of such a theory is complex, and often fails to describe the anticipated causal connections in the most basic manner. For example, events could be left without linkage, or only linked at the macro level by being part of a group of activities. Furthermore, where linkages are established, the nature of those linkages are not always adequately explained (Davies, 2018). Despite these limitations, the theory of change has been discussed and deployed in research concerning co-production and value co-creation.

Co-production theory has been used to examine factors linked to co-production. For example, Clark et al. (2016) argue that co-production could be linked to innovation systems and actionable solutions. In a similar vein, Steiner et al. (2022) conceived a framework through the application of co-production theory to address policymakers and practitioners. They discuss several concepts, including innovation, personal benefits and the value in co-production outcomes. It is further evidenced that researchers have investigated the potential relationship that could exist between the producer (e.g., instructors), and clients (learners), in the co-production process within an education context; thus, creating value in the process (Ostrom, 1996).

The preceding discussions have highlighted the importance of the co-production theory, or theory of change for co-production, in investigations concerning value co-creation and co-production. Nevertheless, it can also be seen from extant literature that research efforts that have applied co-production theory, or theory of change for co-production, are sparse (Loeffler and Bovaird, 2018). This gives rise to two problems. One such problem is the lack of adequate research outcomes that have applied co-production theory, or theory of change for co-production, which could lead to questions vis-à-vis the validity of application of co-production theory, or theory of change for co-production, to research concerning co-production. The second is that application of the current forms, or statements of theory of change for co-production, or co-production theory, may lead to research outcomes that may raise questions as to their acceptability. Researchers need to be conscious of these problems whilst conducting research applying the theory of change for co-production or co-production theory.

2.7.3. Stakeholder Theory

According to Freeman (2017) stakeholder theory states that an organisation can be construed as comprising a set of value-creating relationships that could exist between groups of people belonging to that organisation (stakeholders) and having a stake in the businesses of that organisation. Stakeholder theory discusses the way in which the various stakeholders of an organisation, interact with each other to create value (Freeman, 2017). It is a theory that is concerned with what can aid or impede the achievement of organisational objectives, within the context of organisational management and ethics (Phillips et al., 2013). Another iteration of stakeholder theory states that while keeping in view the long-term interests of an organisation, said organisation must conduct its business operations in a way such that every stakeholder is satisfied with what the organisation gives him/her, and what he/she receives. This implies that an organisation must ensure that stakeholder interests are balanced over time (Freeman et al., 2007). The aforementioned examples of the statements of stakeholder theory have one important thing in common; the emphasis on stakeholder relationships that can (co)create value. The importance of this theory arises from the fact that when value co-creation is being investigated in a context where stakeholders are involved, the theory provides a degree of explicatory power that is useful towards explicating how co-creation could occur.

Stakeholder theory is widely used in research that tackles value co-creation. For instance, Beck et al. (2023) investigated how to achieve sustainable development goals through stakeholder value creation. In their study, they applied stakeholder theory to explicate the process of stakeholder value creation (SVC). SVC was purported to explain the satisfaction and concordant interactions between urban stakeholders (Tantalo and Priem, 2014; Beck and Storopoli, 2021; Beck and Ferasso, 2023). Vidal et al. (2015) investigated value creation models in Brazilian firms using stakeholder theory. Park and Shin (2021) investigated SVC applying stakeholder theory. They studied the social entrepreneurship of students. They argued that it is possible to know how the social entrepreneurship of students influences student benefits, through encouragement to be engaged in certain activities concerning their chosen discipline.

Despite the fact that stakeholder theory is widely used to explain stakeholder value creation, it is criticised for having numerous limitations. For example, Phillips et al. (2003) state that stakeholder theory fails to take into account the mode of, or procedure for, distribution of value, with its focus being limited to the distribution itself amongst the different stakeholders. They further cite issues related to the main purpose of an organisation, where firms can risk becoming aimless if Friedman's profit maximisation principle is demolished in favor of a stakeholders' view. Moreover, the theory does not address supererogatory work, which is considered to fall out of the purview of the theory (Phillips et. al, 2003). Other researchers have levelled their own criticisms. For instance, Key (1999) wrote an entire paper that critiques stakeholder

theory, in which she highlighted the lack of sufficient theoretical underpinnings to enable the theory to adequately explain linkages between internal and external variables, nor address environment analysis, *inter alia*.

In the pursuit of an enhanced stakeholder theory, some researchers have argued for the need to have a broader perspective that takes into account the linkages between different variables within a network (Frow et al., 2014). Other researchers call for a synthesis, or subsumption process, integrating key elements of stakeholder theory with other theories such as the resource-based theory of the firm (Barney, 2018). Nevertheless, it is worth noting that stakeholder theory has been used in research to explain the operation of a number of factors. For instance, stakeholder theory is used to understand how stakeholder relationship leads to of value co-creation, with a focus on capabilities such as innovativeness and autonomy, among others (Kujala et al., 2019). Similarly, Langrafe et al. (2020) investigate stakeholder relationships and value creation through knowledge sharing and other related processes, within the higher education context. However, one is hard-pressed to find any empirical evidence in the literature of application of stakeholder theory as the sole theory capable of explaining the phenomenon or relationship between two entities involved in explicit value co-creation without the support of other theories. For example, Jiya (2021) used theory of change, in conjunction with stakeholder theory, to investigate the role of stakeholder engagement in producing ICT research projects that are deemed socially desirable. Jiya (2021) laid equal importance on both the theories to explain the phenomenon of stakeholder engagement. Similarly, Almeida et al. (2022) used stakeholder theory, theory of value creation, and theory of value maximisation in understanding creation of value for sustainability.

Based on the aforementioned, it is evident that there is a glaring paucity in empirical studies investigating value co-creation, value-in-use, and co-production in a higher education setting. It is imperative that further research efforts should address the value co-creation process from the perspective of faculty-student interactions leading to individual innovation behaviour. This is an important gap in the literature.

2.7.4. Experience Economy Theory

Initially propounded by Pine and Gilmore (1998), there is no singularly recognised definition of experience economy that stands out in the literature. However, the descriptions and definitions are similar in meaning. The experience economy concerns how users, or receivers, of a good or service react to, and use, experiential dimensions. Pine and Gilmore (2013) describe the experience economy as being an economic shift from the focus of service delivery to staging experiences. They regard this shift as the next paradigm in creating added value, through an altogether new market offering, distinct from commodities, goods, and

services. Another definition proffered by Sundbo and Sørensen (2013) describes it as constituting activities that concentrate on the fulfillment of peoples' need for experiences.

The experience economic theory has found application in understanding value co-creation by various researchers. For example, Prebensen et al. (2016) argue that experience could be explained via the concept of value-in-use. Similarly, while investigating quality of life through co-creating tourist experience, Lončarić et al. (2018) have argued that experience marketing can be explained by experience economy theory. Other researchers have argued that the literature concerning management and marketing-oriented experience economy talks about evaluating experience creation in various organisations vis-à-vis concepts that include co-creation, learning, and the changing roles of service staff (Prebensen and Foss, 2011; Sørensen and Jensen, 2015; Solnet et al., 2016).

Inspite of the fact that experience economy theory is being increasingly used in research concerning different disciplines, yet it is not free from criticism. For instance, the experience economy theory is criticised for its focus on the 'product' rather than the 'customer' when applied (Morgan et al., 2009). Holbrook (2001, p.139) criticises that experience economy theory is 'a gloriously upbeat, positive and opportunistic picture of consumer culture full of millennial optimism'. Prahalad and Ramaswamy (2004c) emphasise on the need for application of the experience economy in such a way that moves past a firm-centric view that regards customers as passive bystanders experiencing a well-rehearsed production.

Furthermore, the literature indicates that application of the experience economy theory, to research concerning value co-creation, has been related to such constructs as value co-creation, co-production, value-in-use, student or individual benefit(s), and innovation strategies. This is evident in Leem (2021), wherein experience economy was applied to explain constructs like value co-creation, co-production, value-in-use and student benefits. In a similar vein, Morgan et al. (2009) argued that innovation is an important construct that could be explained by the experience economy theory in the context of value co-creation.

Based on the preceding discussion, the experience economy theory can be said to have proven its utility in explaining how a number of factors can be linked to value co-creation. However, it is also observed that the experience economy theory alone is not sufficient for explaining the phenomenon of value co-creation, as it requires the support of other theories, such as S-D logic, in order to adequately elucidate how various factors can be associated with each other. For example, Leem (2021) investigated the relationship between value co-creation and student benefits using experience economy theory and S-D logic. How a combination of theories will explain a resultant phenomenon is a challenge that needs to be studied in any research

concerned with value co-creation. Moreover, it is also not clear how the experience economy theory can be used to explain variable classroom experiences gained by students when they are involved in a co-creation process within the classroom. This is a gap in the literature, as the experience economy theory does not clearly explain the concept of experience; one example of the theory's limitations (Sundbo and Sørensen, 2013).

2.7.5. Self-determination Theory (SDT)

According to Ryan et al. (2022), self-determination theory is a framework that addresses many important questions relating to human motivation and wellness. As far as value co-creation is concerned, Saha et al. (2021) argued that SDT is useful in explicating the process of value co-creation through the concept of motivation. Many researchers have argued that high motivation is an essential requirement for customers to participate in the process of value co-creation (Ryan and Deci 2000, 2017; Meyer and Gagne, 2008; Könings et al., 2021). Hence, the theory of self-determination can find application in explicating value co-creation itself as a concept. This argument can be extended to the context of higher education. For instance, Tinto (2005) argues that students could be retained through innovative practices and the encouragement of students by professors. This happens because professors have direct contact with the students. Student retention is one example of a possible value (co)created within and by the interactions between professors and students. This happens because of the high motivation generated in students, through the innovative teaching of professors, which occurs during the interaction between students and professors. In a similar vein, Kahu and Nelson (2018) asserted that the staff-student relationship can affect the feeling of belonging and well-being, which leads to a higher level of involvement and engagement by students. This is similarly affirmed by Jain et al. (2022) in their study, which used semi-structured and in-depth interviews, where they found the quality of the relationship to affect student engagement.

Self-determination theory is not without limitations. Sheldon and Niemiec (2006) argued that the needs explained by SDT may not be universal, as some believe them to be learned dispositions that are variable across different individuals. Additionally, other theories, for instance coherence theory, suggests that it is not motivation and well-being alone that address the psychological needs of human beings but aspects like a sense of coherence that needs to be satisfied (Zhang et al., 2023). These arguments indicate that motivational and well-being aspects alone, as per SDT, are not sufficient when investigating value co-creation. As such, other theoretical aspects need to be applied in future research in order to develop more holistic conceptualisations that are practicable and useful to managers.

Furthermore, the most important factors that are widely addressed by researchers, with relevance to self-determination, include autonomy, competence, and relatedness. These factors are supported by hypotheses of universal needs, as discussed extensively in the seminal works of Deci and Ryan (1985; Ryan and Deci 2002). This implies that when value co-creation occurs, factors like autonomy, competence and relatedness need to be considered. However, the literature shows that researchers who apply self-determination theory to discuss value co-creation do not always include these aspects in their research, despite the calls for more comprehensive models (Payne et al., 2008). For example, Cai (2023) has only used the concept of autonomy in his paper investigating consumers' continuous participation in virtual CSR co-creation activities. In the same vein, Zhang (2023) argues that it is possible to explain consumer co-creation experiences using SDT. However, she contends that the co-creation process occurs only if consumers have a strong sense of autonomy and competence, but not relatedness. These arguments suggest that application of SDT is not absolute. This, in turn, leads to the inference that there could be scope to include other aspects in research when investigating the value co-creation process through SDT. Wilton (2021) posits that co-production can be understood by using SDT. Similarly, Saha et al. (2022) argue that SDT explains the value co-creation process, and that the main criterion associated with that is the value-in-use. Saha et al. (2022) go further and argue that the concept of co-innovation can be indirectly explained by SDT by arguing that SDT helps explain value co-creation. Additionally, Tinto (2005) argues that innovation occurs during the process of value co-creation and could be explained by a combination of S-D logic theory and SDT. Finally, the literature provides some evidence to suggest that student benefits, as a concept, could be understood through application of SDT (Cheon et al., 2023). This is supported by Ryan and Deci (2017) who make the case that SDT can explain students' social functioning as part of their pro-social behaviour; an act that is volitional in nature and beneficial to others (Bergin, 2018), for example, helping, sharing, and socially including. This volitional act could lead to student satisfaction through a feeling of giving to others, which is the benefit the student derives (Martela and Ryan, 2016).

The abovementioned establishes that the use of SDT in understanding behavioural aspects of people, including students, can provide useful insights, but equally important, that SDT cannot be applied universally. One key point that emerges is that SDT is argued to be working in conjunction with S-D logic theory to explain some factors related to value co-creation, especially ones related to innovation. However, the literature is silent on which specific factors in the value co-creation process need to be applied through the combination of S-D logic and SDT theories when taken together. As such, the preceding sections demonstrate that researchers have used S-D logic theory in general to explain value co-creation. However, it is also important to recognise that value co-creation can only occur if customers have a high level of motivation which is not explained by S-D logic but SDT. Therefore, it is incumbent that further research is

undertaken to understand how a combination of theories can explain phenomena linked to value co-creation like co-production, innovation, value-in-use, and student benefits, as found to occur and emerge throughout the value co-creation process. The lack of understanding surrounding these theoretical aspects represents a clear gap in the literature.

2.7.6. Social Capital Theory

Dávid et al. (2023) assert that there are several ways by which social capital can be defined. For instance, Lukács and Dávid (2019) explain social capital in terms of networking at the individual level, with a personal network considered an important deterministic factor. Adler and Kwon (2002) describe social capital as the accumulated good-will which accrues from an individual's social network, with the possibility of leveraging such good-will for certain benefits. Itani et al. (2023) use this definition in their study of salespeople's use of social media, wherein they found that the use of social media enhances social capital, which in turn drives value co-creation. Hence, the literature shows that an individual's life is expected to be affected by social ties, and both the size and composition of personal networks, and that these aspects define the available resources possessed by the individual. Furthermore, it is argued that an individual can gain access to various goods, resources, and different groups, or organisations, using one's personal network. However, such access is a function of the social networks at the meso-level, emerging out of the relationship between the individual and society (Dávid et al., 2023). Those resources are called social capital by Bourdieu (1986) and Coleman (1988). This view is adopted by Lin (2008) who posits that the resources that an individual can access, organise, and deploy, using his/her relationships, are called social capital. These definitions informed subsequent conceptual developments and enabled researchers to formulate the theory of social capital.

Bourdieu (1986) explains that social capital theory revolves around relationships and argues that such relationships are made available via both material and symbolic exchanges. In Putnam's (1993) seminal work "*Making democracy work*," he argues that exchanges that secure relationships are characterised by reciprocity and trustworthiness; an important ingredient for a properly functioning government. He addresses the concept of social capital and raises the critical question of how to invest in social capital. Yet another definition of social capital, proffered by Jones (2010), states that it is the inclination towards, and practice of, cooperating with others.

From the view of contemporary research, social capital theory is seen by many as being suitable for social advancement, wherein social capital is regarded as a stock variable (Putnam, 1993; Thompson, 2018; Muringani et al., 2021). Despite its usefulness to research concerning social aspects, extant literature

suggests numerous limitations. The literature evidences a lack of general agreement on the definition of what constitutes social capital in both policy discourse and academia (Lin, 2008; Julien, 2015; Ahn and Davis, 2020). Some of the other criticisms levelled against social capital theory include its overuse as a putative panacea to innumerable social problems in social policy making, rendering its heuristic value questionable (Portes, 1998; Woolcock, 1998; Macinko and Starfield, 2001). Furthermore, the concept of social capital is claimed to create epistemological and methodological tensions amongst researchers, as it overstretches the definitions and interpretations arising out of its purported flexibility (Woolcock, 2010).

Despite its limitations and the criticisms levelled against it, social capital has provided a strong basis to explicate social aspects which extend to value co-creation research. This is evident from the most important concept addressed by the theory; that is the creation of a relationship based on material and symbolic exchange. Social capital theory has been used in different contexts that relate to value creation and co-creation. For example, Daskalopoulou et al. (2023) studied the role of social capital, in their research concerning social entrepreneurship and social capital, which they found to act as both a mediator and moderator in the process of social value creation. Similarly, Badawi and Dragoicea (2023) investigated the role of social capital as a resource in their research on the value co-creation process in collaborative environments for technical and vocational education and training (TVET). Such research efforts have highlighted the usefulness of the application of social capital theory in explaining value co-creation, co-production, innovation, value-in-use, and benefits to individuals like students (Badawi and Dragoicea, 2023; Daskalopoulou et al., 2023).

2.7.7. Social Exchange Theory

The theory discusses a person's (sender) positive behaviour vis-à-vis another person (receiver) within the context of a relationship that is interdependent. This relationship can create a potential situation for the receiver such that the receiver feels obligated to reciprocate by returning the positive behaviour (Berber et al. 2022). An example of how this occurs can be demonstrated by the following hypothetical. In an organisation, if an employee perceives that the practices of employers are positive, then that employee, or employees, is/are expected to show a positive work attitude and behaviour. On the other hand, if an employee, or employees, feel that the employer is adopting unfair or negative practices towards them, then that employee, or those employees, will display a negative attitude and behaviour within the organisation (Gašić and Berber, 2023). Another description of social exchange theory holds that employment is composed of a series of resource exchanges between employees and employers. Through exchanges, which are characterised as being interpersonal and interdependent, the two engage in interactions which produce mutual and reciprocal obligations (Cook et al., 2013; Bordia et al., 2017). Social exchange theory is widely

used in many research areas including value co-creation (Preikschas et al., 2017; EL Mekebbaty, 2023). There are a number of aspects of value co-creation that have been addressed in the literature by applying social exchange theory. These include dignity, self-esteem, socio-emotional rewards, dedication, and commitment to continue the relationship with an organisation. All of these are intangible rewards (Janjua and Ramay, 2020; Janjua et al., 2021). Contexts in which social exchange theory have been applied to explain value co-creation include the business sector and the higher education sector (Janjua and Ramay, 2020; Janjua et al., 2021; Siaw and Sarpong, 2021).

Originally postulated and discussed by Blau (1964) and Homans (1961), social exchange theory offers support to explain how promoting social exchange and value creation in an enterprise provides an opportunity for the enterprise to seize greater initiatives in their businesses (Siaw and Sarpong, 2021). One of the main contributions of social exchange theory is the notion concerning exchange relationships. When resources are exchanged between two entities, this gives rise to the establishment of a high-quality relationship between those two entities. This in turn leads to the generation of beneficial and productive behaviours (Blau, 1964; Cropanzano and Mitchell, 2005). This could be witnessed in the context of higher education classrooms, wherein the impact of the professor on the student can create a high-quality relationship between the two, leading to a higher likelihood of an innovative education experience, and encouragement to the student. In a typical classroom there is normally an exchange of experiences between a professor and the students. The exchange of knowledge and skills, which can be bi-directional, is part and parcel of the co-created experience. Such exchange constitutes a critical element in the relationship between the professor and student(s). Additionally, inherent to the act of teaching-learning is the sense of service(s) rendered. These arguments indicate that in applying the concept of value co-creation, the role of social exchange becomes evident, insofar as it serves as a basis for explaining such value co-creation from a processual perspective. Although some examples of value co-creation have been provided above, there are several limitations to social exchange theory; from the limited explanatory capability, low predictive power, vagueness in the theoretical principles, and overlapping of constructs which creates fuzzy conceptual boundaries leading to the divergent and inconsistent interpretations (Davlembayeva and Alamanos, 2023). These limitations can sometimes give rise to serious questions on the validity of the outcomes produced in research where social exchange theory has been used.

Given the aim and scope of this research, the review of the literature on the application of social exchange theory was generally restricted to certain components of value co-creation in the context of higher education, namely, co-production, value-in-use, innovation and student benefit(s). As for co-production, it is observed that social exchange theory can play a role in explaining how value occurs during co-production

to some extent. Co-production is a process of reciprocal exchange that could be fostered amongst multiple stakeholders, leading to the production of synergistic outcomes that would otherwise remain hidden or out of reach (Ostrom, 1996; Durose et al., 2022). Nevertheless, despite the fact that co-production could be explained to some extent by social exchange theory, it appears that such a theory cannot fully explain or account for how value is created when quality relationships are involved. Equally important, when value creation is viewed as a behavioural aspect, some cases of exchange, as explained by the social exchange theory, could be mere transactions and not real exchange that fosters the creation of a good relationship. This presents a limitation if one intends to apply social exchange theory to the phenomenon of value co-creation. In the same vein, with regard to the concepts of value-in-use, innovation, and student benefits, it is established that social exchange theory can only be applied to explain the parts of the exchange that constitute transactions, not an ongoing relationship. This discrete view of exchange is inconsistent with the dynamic, recursive, and iterative nature of value co-creation. When the limitations of applying social exchange theory are taken into account, the explanatory power of the theory becomes suspect (Davlembayeva and Alamanos, 2023). Consequently, it becomes evident that while social exchange theory is applied by many researchers towards the explication of value co-creation (Lee and van Dolen, 2015; Breidbach and Maglio, 2016; Lin et al., 2017), critics of social exchange theory argue that the imprecision and lack of clarity in defining the constructs involved makes it very difficult to be used alone across disciplines. This limitation renders the application of social exchange theory, in investigations concerning value co-creation, vulnerable to questions being raised as to the validity of the outcomes of such investigations. Researchers must therefore exercise caution when applying this theory in research and should be ready to unequivocally explain how social exchange theory can be applied in value co-creation research.

2.7.8. Creativity and Innovation Theory

Krskova and Breyer (2023) argue that one of the influential theories postulated vis-à-vis innovation and creativity is the model of creativity and innovation in organisations by Amabile (1988). This was called the model of creativity and innovation in organisation (Krskova and Breyer, 2023). According to Amabile (1996), in any organisation the successful implementation of creative ideas is considered as innovation, whereas creativity is defined as the generation of new, unique, and useful ideas in a field. Creativity and innovation are considered distinct, yet closely related, concepts (Phan et al., 2010). This theory is also called the componential theory of creativity (Amabile, 1996; Valaei et al., 2017). The theory explicates the creative behaviour of individuals in association with innovation behaviour (Amabile, 2018). Many researchers are of the view that a thorough and comprehensive conceptual explanation of organisational and individual innovation is still missing in extant literature. Moreover, the factors that influence innovative

behaviour, and an in-depth understanding of how the creative efforts of individuals in organisations can translate into organisational, or individual, innovation, are missing as well (Anderson et al., 2014; Tang, 2017).

Other related concepts that are commonly used in the literature include the concept of individual innovation behaviour; introduced by Scott and Bruce (1994), and the concept of individual work behaviour by Janssen (2000) which was built on the concepts of Scott and Bruce (1994). Scott and Bruce (1994) argue that four different systems interact to produce individual innovative behaviour, namely, the individual, leadership, work group, and climate for innovation. Janssen (2000) argues that the concept of individual work behaviour can be related to job demands when conducive conditions exist. One example of such conditions would be when employees perceive rewards' distribution as being fair and properly associated with effort. Nevertheless, these two conceptualisations do not include other factors that can be responsible for innovative behaviour, for instance, creativity as indicated by Amabile (1988). Further still, the literature demonstrates that researchers have used other theories such as the efficiency-oriented perspective and the social-political perspective (Yuan and Woodman, 2010) to discuss the concept of creativity and innovation behaviour, yet there is a lack of consensus as to which theory could be applied universally to explain the concept of individual innovation and creative behaviour. Notwithstanding the lack of consensus, this research relies upon the theory of creativity and innovation, as proposed by Amabile (1988), and critically analyses the adequacy of its application.

As for the core concept of value co-creation in this research, it is evident that innovation behaviour can demonstrably create value in the literature. Shiu (2017) argues that innovation, which is part of the twin concepts of innovation and creativity, is the base of customer value co-creation and new product development. Similarly, Roberts et al. (2013) discuss consumer motives for engagement in innovation and value co-creation. They recognise the paucity of studies related to customer-centric innovation, which indicates a gap in the literature. Concomitantly, there is scope for the application of creativity and innovation theory, as it provides a useful basis and explanatory power vis-à-vis the concept of innovation behaviour, as described by the theory.

Application of the theory of creativity and innovation can be seen in the literature, wherein researchers have used this theory to explain both individual and organisational innovation behaviour. For instance, Hussain and Wahab (2021) studied the link between employee creativity, innovative behaviour, and organisational innovation, in which one the theories used was the theory of creativity and innovation. Similarly, Ren et al. (2020) studied the boundary of crowdsourcing, in the domain of creativity, using the concepts of the theory

postulated by Amabile (1996). There are several other examples that could be found in the literature that show the application of the theory of creativity and innovation; for instance, Krskova and Breyer (2023), and Emami et al. (2023).

The theory of creativity and innovation, however, is not without limitations. For instance, Acar et al. (2019) argue that constraints affect creativity and innovation in an organisation. Examples of such constraints include rules and regulations, deadlines, and the scarcity of resources. The effect of those constraints is not accounted for by the theory of creativity and innovation. Similarly, Wang and Nickerson (2017) argue that when dealing with creativity support systems, which include product design, idea generation, and research & development, it is not possible to fully explain the phenomenon of creativity in firms with extant theories. This implies the theory of creativity and innovation alone may not be sufficient to adequately explicate the various factors that affect the creative and innovation behaviour of individuals who are part of the innovation process.

Many of the factors that have been explored and identified in the literature through the application of the theory of creativity and innovation, or the componential theory of creativity, can be linked to the value creation and co-creation process. Phan et al. (2010) argue that entrepreneurship is an important component of creativity and innovation, as it produces value in the form of innovations. Chell (2007, p. 18) argues that entrepreneurship can be described as a process that involves identifying and exploiting opportunities leading to value creation. According to Tang (2017), the description of entrepreneurship by Chell (2007) highlights problem finding and appropriateness, where problem finding could be linked to the ability of entrepreneurs to identify opportunities, whereas appropriateness could be linked to the concept of value creation. If one applies the description of value creation by Chesbrough et al. (2018), which describes value-in-use as the value created in the actual deployment of resources to realise a goal, then the term appropriateness of the value created could be linked to value-in-use. This implies that the concept of innovation, as achieved by entrepreneurs based on the opportunities recognised by them, can be linked to the value co-created by those entrepreneurs, which is further emphasised by the appropriateness of the innovation. Moreover, innovations yield benefits to the user, who is part of the co-creation process, and the innovation behaviour, as explained by the theory of creativity and innovation, becomes useful in understanding the value creation process in multiple contexts.

Innovation is identified as part of the co-production process, which in turn is linked to the concept of value co-creation (Canhoto et al., 2016). Hence, innovation behaviour as a concept, can be explained by the theory of creativity and innovation. It is evidenced that innovation behaviour has been investigated in the context

of higher educational institutions (e.g. Canhoto et al., 2016). Thus, any innovation behaviour, both on the part of the faculty and the student, could be, at least partially, explained using the theory of creativity and innovation.

2.7.9. The Innovation Competence Model

One of the important arguments put forward by researchers states that value co-creation occurs when competence, as a factor, is involved (Vargo and Lusch, 2008; Elo et al., 2023; Visvizi et al., 2023). Hansen (2020) cites Vargo and Lusch (2008) vis-à-vis their definition of service, wherein service is regarded as the application of competencies that benefit another party. Vargo and Lusch (2008) refer to knowledge and skills as competencies. Similarly, Visvizi et al. (2023) argue that one of the enablers of value co-creation is the ability-propensity of students and instructors with regard to the use and application of technologies. The enrichment of the digital competencies of those instructors and students is argued as contributive to value co-creation (Visvizi et al., 2023). Thus, it can be posited that competence, as a concept, requires theoretical underpinnings in order to reach a better understanding of its operationalisation in research.

The central focus of this research revolves around the concept of co-creation of innovation. This is found in the literature, whereby innovation competency is recognised as an important perspective that needs to be considered when investigating innovation and value co-creation (Takahashi and Takahashi, 2021; Chatenier et al., 2022). Thus, the focus is on innovation competency, not just competence in the generic sense.

Given the focus on innovation competency, it is acknowledged that some of the theories found in the literature are, often, supportive of the view that innovation is at least partly derived through competency. Hence, the theories concerning innovation competence generally focus on competency, with linkage of competency invariably to innovation. Taking this into account, it appears that researchers have attempted to explain the phenomenon of innovation competency using various competency related theories, including the competence theory, resource-based theory, the evolutionary theory (Kállay, 2012), and the innovation competency model developed by Marín-García et al. (2013). Competency theories have been postulated as multiple perspectives by many authors (Shim, 2008); a list of which has been provided by Shim (2008). Although the list is comprehensive, those theories have predominantly focused on competence rather than innovation competency; hence, they were not considered applicable to this research.

The resource-based view of the firm has been widely used by researchers to explain the competency construct (Teece et al., 1997; Hoge et al., 2005; Armstrong, 2008; Wulandari et al., 2017), with an understanding that it contributes to innovation (Ovbiagbonhia et al., 2019). Nevertheless, this theory is not

without limitations. One of the limitations is that it fails to explain the competitive advantage certain firms are able to achieve within the context of a turbulent business environment (Kleinschmidt et al., 2007). This is because the theory is regarded as being more concerned with the internal environment rather than the external one. Additionally, Lewis et al. (2010) argue that the resource-based theory does not take into account exogenous resources while explaining why firms achieve competitive advantage, wherein only an internal view of endogenous resources is considered vis-à-vis competitive advantage. These limitations constrain the application of resource-based theory to this research, as the concept of innovation competence is shown to be dependent on external resources also (McPhillips et al., 2022).

The evolutionary theory is found to be treated as a subset of the competence theories (Hodgson, 1998). Hence, based on the discussions about competence theories already provided above, this review does not further scrutinise the applicability and relevance of evolutionary theory. However, this review of the literature considers the importance of the innovation competence models that provide an understanding of the twining of the two concepts, namely innovation and competence, as discussed in extant literature.

The literature suggests that there are no formal tenets or premises that can be considered as constituting a theory that explains the phenomenon of innovation competence model. Nevertheless, there are examples of perspectives of innovation competence, formulated as theoretical models, found in extant literature. For example, four European Universities were involved in the Innovation Competencies Development (INCODE) project (Charosky et al., 2022). Through this project, which was financed by the European Union, an innovation competencies construct was developed that was based on the original concept of Penttilä and Kairisto-Mertanen (2012). The resultant innovation competencies construct is provided in figure 2.4.
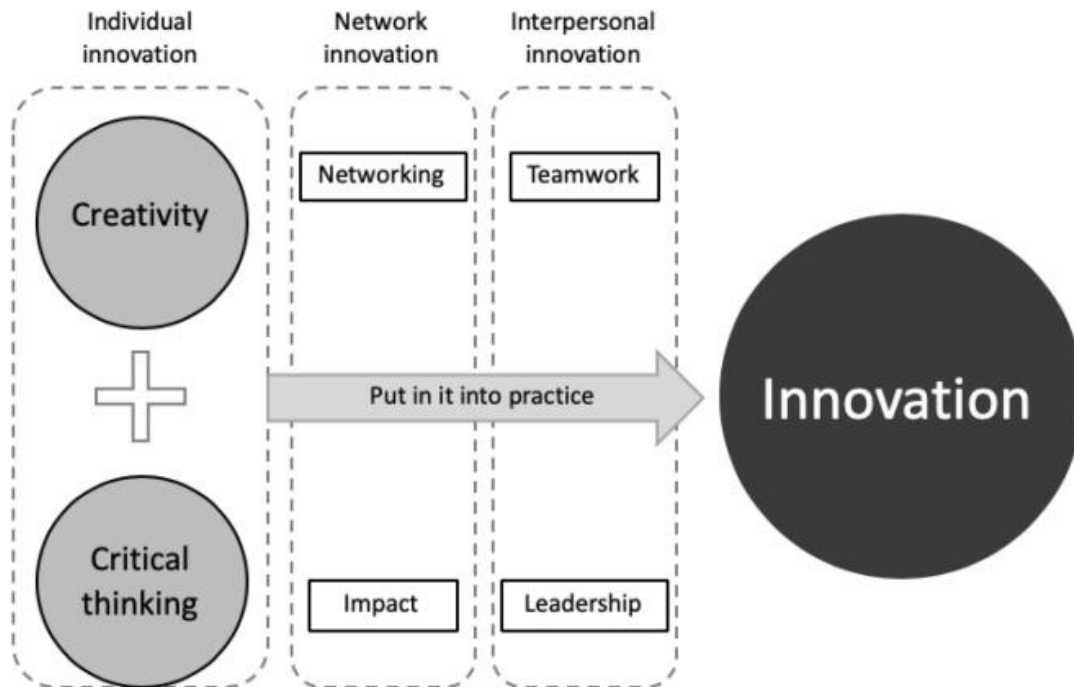
Figure 2.4: The INCODE innovation competence model (Source: Charosky and Bragós, 2021)

The main feature of this model is that it is composed of three primary competence dimensions; namely the individual dimension that involves creativity and critical thinking; the interpersonal dimension that involves teamwork and leadership; and the network dimension that involves networking and impact. These three dimensions are expected to lead to innovation beahviour. This model was developed in the context of higher education, with a focus on learners. The model is called the INCODE Barometer. This model has been criticised for its lack of validity with regard to its psychometric properties and had not been tested for its usefulness in innovation competence studies pertaining to industry (Butter and Van Beest, 2017). This model has been widely used in research concerning the concept of innovation competence, for example in the studies conducted by Charosky and Bragós (2021), Saulich and Lehmann (2017), and Kopelyan et al. (2016). However, application of the INCODE barometer as part of studies involved in value co-creation are rare to find, although Torres et al. (2019) discussed the generation of value in their study of the innovative ability mission of the enterprising university, in which INCODE Barometer was used. This clearly points to the need for the INCODE Barometer, as a concept, to be used in research concerning innovation competence as related to value co-creation. This is a gap in the literature, and the central focus of this research project.

Furthermore, the literature shows that there are other examples of innovation competency models that have been developed by researchers. For instance, the Framework for Innovation Competencies Development

and Assessment (FINCODA), and the National Endowment for Science, Technology and the Arts of United Kingdom (NESTA) (Charosky and Bragós, 2021; Charosky et al., 2022). While FINCODA is considered as a model that is an extension to several existing models and is built upon innovation competency models, NESTA is considered to be slightly different. NESTA was developed as an innovation competency model in the UK (Chell and Athayde, 2009). FINCODA is generally considered to be based on INCODE (Andreu-Andrés et al., 2017), and is argued as being useful for application in different organisations (Marín-García et al., 2016). INCODE is considered to be useful for application in higher educational settings in particular (Watts et al., 2013; 2014). As far as NESTA is concerned, from a conceptual standpoint, it appears to be similar to INCODE, except that it is composed of five components, namely, creativity, self-efficacy, energy, risk-propensity and leadership which are different to the three identified in the case of INCODE (given above). With regard to INCODE, a barometer was developed by Marín-García et al. (2013) which has been used in research concerning innovation competence. NESTA has also been suggested for use in measuring innovation competence, in the higher education context, although evidence of the application of NESTA in innovation competence research is sparse (Charosky and Bragós, 2021; Charosky et al., 2022).

2.8. Main Concepts involved in the Value Co-creation Process

Numerous concepts have been applied in research concerning the value co-creation process. The literature indicates that co-production and value-in-use are two of the main concepts that come into play in the value co-creation process. Previous studies exist that tackle other concepts, such as innovation in the context of university-industry collaboration (Osorno-Hinojosa, 2022), and student benefits as well, however, to a lesser degree (Leem, 2021). Studies tackling the concepts of innovation behaviour, in general, and innovation competencies, in specific, are scant, pointing towards a gap in the literature. These concepts are discussed in detail in the following sections vis-à-vis their definition, conceptual delineation, conceptualisation, and relevant theoretical underpinnings.

2.8.1. Co-production

The concept of co-production is regarded as an important part of value co-creation research (Marcos-Cuevas et al., 2016; Brandsen and Honingh, 2018; Brandsen et al., 2018b; Bandola-Gill et al., 2022). The literature on co-production shows that it is a phenomenon that occurs in various contexts including new public management (McMullin, 2023), the education sector (Compton and Meier, 2016; Chapman, 2019; Woods and Homer, 2021), healthcare (Miles et al., 2018; Lee et al., 2022; Smith et al., 2022), sports (Smith et al., 2022), industry (Parry, 2012; Smith et al. 2022), public services (Pestoff and Brandsen, 2013; Van Eijk and Steen, 2016) and business (Marcos-Cuevas et al., 2016). Co-production as a concept has been the concern of many researchers in recent times (Polk, 2015; Miller and Wyborn, 2020; Bandola-Gill et al.,

2022), although research on co-production itself does not have a particularly long history, with the initial concept conceived somewhere in the nineties (Ostrom, 1996; Bester et al., 2021).

Co-production is said to occur when a customer and service provider interact (McMullin, 2023). In the case of public services, co-production is said to occur when the service provider and the citizens interact (Steen and Brandsen, 2020). Similarly, in the education sector co-production is found to occur in higher education settings between faculty and students (Elliott et al., 2021). Examples of co-production include:

- The collaboration between teachers and parents aimed at improving the educational development of the children of those parents (Honingh et al., 2020).
- The collaboration amongst researchers, policy makers, and citizens, to achieve improvement in quality, as well as relate the importance of research to policy making (Redman et al., 2021).
- Integration of resources in a higher education institution that help in those institutions to innovate (Dollinger and Lodge, 2018).

The benefits of co-production are many. Benefits could include improvement in the quality of performance of an organisation, improved effectiveness of performance, cost-effectiveness, user satisfaction, organisational performance improvement, learning new things, development of trust, citizen empowerment (Vanleene et al., 2015), and personal incentives like student outcomes (Eijk and Steen, 2016; Alford, 2002). Risks involved in co-production include time-consuming effects of co-production leading to increase in costs, lack of fulfillment of expectations, creeping perception of unfairness during the process of co-production, and the lack of impact of the results of co-production (Vanleene et al., 2015).

Furthermore, to better understand the concept of co-production, it is important to examine issues relating to what co-production is, how it occurs, who are the actors involved in the co-production process, and what are the factors that could affect co-production. The literature concerning these issues is discussed in the following sections.

2.8.1.1. Definition of Co-production

There are multiple definitions of co-production. Different researchers have defined co-production in different ways. Examples of such variability in definition are provided in the table 2.9. The main proponent of co-production as a concept was Ostrom (1996), who initially proposed this concept in the seventies (Parks et al., 1981; 1999; Ostrom, 1996).

#	Definition	Author(s)
1.	The process through which inputs used to provide a good or service are contributed by individuals who are not in the same organization.	Ostrom (1996; p.1073)
2.	Customers' "participation in the development of the core offering itself".	Lusch and Vargo (2006; p.284)
3.	It is the involvement of users of any public service in such activities which include the design or management or delivery or evaluation of those services either voluntarily or involuntarily.	Osborne et al. (2016)
4.	The concept of co-production finds meaning in different activities associated with public services, for instance co-delivery, co-assessment, co-prioritization and co-planning, that can be combined with an aim to engaging professionals and citizens in regard to commissioning and provisioning those services.	Eijk and Steen (2016)
5.	Co-production is about the interaction between service users and service providers—it is not the same as 'consumerism' or even user empowerment.	Osborne et al. (2018; p.19)

Table 2.9: Definitions of co-production (Source: Author)

These definitions provide an understanding of what co-production could be in concise terms. The table above illustrates how co-production could mean different things to different actors involved in the co-production process. For instance, if one takes the definition of co-production as proffered by Ostrom (1996), it is evident that co-production concerns individuals who are actors involved in the co-production process, taking place in an organisation, but not belonging to the organisation. This could imply that the resultant value created by the co-production process could be mainly accrued to the organisation, and not the individual, or for both the individual and the organisation, or perhaps for a third party. For example, in public organisations that utilise consultants, such consultants, being not part of the organisation yet participating in the process co-production in the organisation, may benefit the organisation and perhaps the citizens concerned with that organisation. However, application of the definition of co-production provided by Ostrom (1996) could be challenging to a classroom activity in a higher education context where innovation occurs, for it is difficult to determine whether the individuals involved in the co-production process, for example, students, are internal or external to the organisation which is the higher education institution in this case. This ambiguity is not discussed in the extant literature. Thus, it is evident that this definition of co-production, provided by Ostrom (1996), has limitations when applied to the education sector.

In the same vein, it can be argued that the definitions provided by other authors have limitations for application in research concerning co-production in the education sector. For instance, when the definition provided by Lusch and Vargo (2006, p.284) is applied to the classroom context in higher education institutions, a contentious issue arises whereby it becomes important to define who is the customer who participates in the development of the innovation that occurs as part of the co-production activity. There is ambiguity with regard to identifying whether the student is a customer and what could be the core activity be (even though the core activity is the educational offering, and within the classroom the core offering could be the teaching and learning appertaining to a particular discipline, not directly related to innovation). When extending similar arguments to other definitions, it becomes clear that the definition by Osborne et al. (2016) is very broad. Consequently, application to specific contexts could pose a challenge. Whereas the definition proffered by Eijk and Steen (2016) appears to be more appropriate for application in the public sphere and not the private sector. Despite the limitations that surround the definitions, it is important that researchers choose the most appropriate definition that fits to a particular research context, to explain the phenomena concerning that research. Therefore, for this research concerning the value co-creation phenomenon, as pertaining to the innovation behaviour of students in the classroom setting, the most suitable definition that appears to be applicable is the one provided by Lusch and Vargo (2006, p.284) as it is both simple and applicable to a wide range of contexts including higher education. Further to discussing the definitions, it is important to understand how co-production as a phenomenon is useful to the core issue of this research which is co-creation. This is discussed next.

2.8.1.2. Co-production and Co-creation

Brandsen and Honingh (2018) argue that concept of co-production has many similarities and differences with the concept of co-creation which are provided in the table 2.10 below.

Similarities	- Direct part of the production process - Collaboration between professionalised service providers and users of those services - No clarity on reference to service users for instance citizens as individuals as individuals or a collective body - Definitions clearly do not refer to organisations - Refer to active input by users of services for instance citizens in shaping services - Definitions distinguish users of services for instance citizens from passive clientelism or consumerism

Differences	- Different kinds of input
	- Co-production is usually linked to the services received by users (e.g. citizens) at the time of implementation of the production cycle. Co-creation on the other hand is related to services at the strategic level
	- Co-production relates to various stages of the production process, whereas co-creation is even more encompassing and may occur post-production (i.e. post-consumption)

Table 2.10: Similarities and differences between co-production and co-creation (Source: Vargo and Lusch, 2004; Brandsen and Honingh, 2018)

A comparison of the similarities and difference between co-production and co-creation shows that there more similarities than differences between the two. However, one of the differences between the two concepts is that co-production may be considered as preceding co-creation, insofar as co-creation occurs at the strategic level whereas co-production occurs at the operational level. For instance, Garcia et al. (2018) explain that in a classroom setting, within a higher education institution, co-design of curricula, which is considered as part of co-production of curricula, is attempted by the instructors and students in order to encourage students to innovate. The value created is expected to encourage a higher level of flexible learning experiences, which would support the needs and goals of the students. This, in turn, could lead to the experiential learning of students. In other words, when co-production involves co-designing, the co-production of the curriculum can be said to occur at the production level. The result of such a co-production is strategic, as it is expected to improve the experiential learning of the students, which is the eventual aim of the higher education institution. The differences between the two concepts are evident. This will be useful in clearly differentiating between the two concepts; allowing for a better understanding of the value created in the interaction between two parties involved in a business transaction. The next section will discuss the literature pertaining to how the phenomenon of co-production is conceptualised.

2.8.1.3. Conceptualisation of Co-production

The phenomenon of co-production has been variably conceptualised in the literature. For instance, Osborne et al. (2018) conceptualised co-production as directly related to co-creation of value in the public service context. Osborne et al. (2018) argued that co-production leads to value co-creation in the public service context, which includes co-design and co-innovation. Chatterjee et al. (2021) conceptualised intention to co-produce as a mediating variable between certain independent variables like customer cognition, equitable concept in a firm that is centered on the customer, and the relationship between the firm and the customer on the one hand, and value co-creation on the other. Leem (2021) conceptualised co-production as a construct that determines the value-in-use and student benefit(s) in the higher education context.

Behnam et al. (2021) conceived co-production as a moderator of the relationship between perceived corporate social responsibility and customer engagement when investigating the moderating role of co-production in the context of non-profit sports clubs. However, Hutchins et al. (2013) conceptualised co-production as a dependent variable in their study of interest in Community-University partnerships.

The conceptualisations found in the literature show that co-production has been conceptualised and operationalised in various ways. This implies that the phenomenon of co-production manifests as a versatile construct in the literature, as it can be conceptualised in a variety of ways, depending upon the subject of investigation. Furthermore, the varied conceptualisation and operationalisation of co-production indicates that there is no consensus amongst researchers on a standard conceptualisation for co-production, and by extension its operationalisation. This observation implies that researchers investigating the concept of co-production need to justify the operationalisation of co-production, as a variable, based on the research question that needs to be addressed. For instance, in this research project it is argued that co-production is an important process that, when taken together with other constructs, constitutes value co-creation in a classroom setting in a higher education context. This indicates that co-production as a concept could act as a determinant of value co-creation which points to the possible conceptualisation of co-production as an independent variable. However, this needs to be justified theoretically, conceptually, and practically. Although there are various conceptualisations of co-production found in extant literature - where co-production is found to be treated as an independent variable - the broader literature indicates that operationalisation of co-production in general poses a challenge (Beresford et al., 2021). Therefore, the outcome of every research effort examining co-production and its influence on other factors, contributing to value co-creation, adds to the body of knowledge concerning co-production and its conceptualisation.

Furthermore, a number of factors have been identified as being associated with co-production and its operationalisation in the literature. For instance, Leem (2021) argued that value-in-use and student benefits are constructs that are linked to co-production in a higher education setting. Similarly, the literature shows that influential co-producing factors have been identified by researchers including factors of co-production, such as institutional or organisational attributes, parents' attributes, student attributes, co-production related activities of parents in the school, and student outcomes (Ostrom, 2005; Voorberg et al., 2015). There are many other factors that have been found to be associated with co-production including customer brand engagement behaviours, customer satisfaction, economic value, and innovativeness, among others (Casidy et al., 2022). Further to the discussion on the conceptualisation and operationalisation of co-production, the next section discusses the application of theories to the concept of co-production and its operationalisation; which is essential to the understanding the function of co-production as a construct.

2.8.1.4. Theoretical Underpinnings for Co-production

Researchers have investigated the concept of co-production using different theories. Osborne et al. (2018) conceptualised co-production using the service management perspective, which concerns co-production and its direct relationship to the co-creation of value in a context of public service delivery. Whereas Clark et al. (2016) used co-production theory to link co-production to innovation and actionable solutions. Similarly, other research efforts focused on co-production have featured the use of other theories, for instance, the theory of empowerment and co-production (Jo and Nabatchi, 2018). Leem (2021) applied both the S-D logic perspective, and theory of co-production, to understand how value co-creation occurs through co-production in a higher education context.

In the pursuit of a theory that provides adequate explanatory power for application in this research project, the influence of co-production on value co-creation and innovation must be considered as central, with the specification of the scope and context in which co-production is considered to occur. This research looks onto the co-production phenomenon as a process that will be investigated in a classroom setting in a higher education institution. Innovation and the value co-created, from the perspective of students, are being investigated, with equal importance, to ascertain how, and to what extent, co-production can contribute to the benefit of those students when an interactive process between the faculty and students takes place within the classroom. Thus, important considerations emerge, whereby it becomes necessary to examine who is involved in the co-production process, what value is co-created through the process, when does that value co-creation occur, how does it occur, and for whom. These aspects need to be explored in order to properly understand what happens in the classroom when value co-creation is the main subject of enquiry and investigation. As such, with co-production being in focus, co-production theory could be applied to explain the phenomenon of co-production, in conjunction with the S-D logic perspective, which can help to explain the more encompassing value co-creation process.

The discussion above serves as a review of the concept of co-production, and its linkage to the concept of value co-creation, which is the core issue under investigation. Although the concept of co-production has attracted the attention of researchers and practitioners alike, the literature suggests that some challenges surrounding the concept of co-production remain. For instance, Redman et al. (2021) assert that although the literature is replete with research studies concerning co-production, yet not many studies have assessed whether co-production achieves its promise, and if so, what are the necessary conditions that need to be in place. Moreover, Redman et al. (2021) argue that another important aspect which requires attention is the fact that co-production is highly context dependent - as previously alluded to in the discussion above. This implies that the outcomes of co-production, and the value co-created through the co-production process,

need to be exclusively examined in every context where there is a possibility to co-create value via the co-production process. More specifically, the literature can be said to suffer from a paucity of studies that investigate co-production in a classroom setting within a higher education institution (Leem, 2021). Further still, if one considers innovation behaviour as a co-created value by students as a beneficial outcome (student benefit) that emerges from co-production in the classroom, available studies are far and few. For instance, Chesbrough et al. (2018) argue that the literature on collaborative value creation is too limited to allow for a clear understanding of the concept of innovation. This is an important gap in the literature.

2.8.1.5. Methodology used in Co-production Research

To date, studies that have empirically investigated co-production and its relationship to value creation have mostly tried to address questions like how, and to what extent, indicating that both exploratory and explanatory studies have been conducted. Leem (2021) used the quantitative research method to explain the influence of co-production on student benefits and value-in-use in a higher education context. However, in exploring why citizens engage in co-production of public services, Eijk and Steen (2016) used focus groups to collect qualitative data. There are other examples found in extant literature which demonstrate that researchers have used both qualitative and quantitative data to examine the concepts of co-production and value co-creation (Brandsen et al., 2018a). However, if one takes into account the research outcomes of the studies conducted by the likes of Eijk and Steen (2016) and Leem (2021), methodological limitations should not be ignored. In light of the limitations surrounding their research, Eijk and Steen (2016) recommended the use of both qualitative and quantitative methods in research that is concerned with co-production and its relationship to value co-creation. This points towards the need for conducting mixed method research in order to gain a deeper and more holistic understanding of co-production and its relationship to value co-creation. This lack of mixed method research studies suggests a gap in the literature.

With respect to the measurement of co-production as a quantity, researchers have utilised validated research instruments to study the concept of co-production. Examples of validated research instruments used by researchers to measure co-production as a quantity could be found in published papers. For instance, Ahmad (2016), Guan et al. (2019), and Leem (2021) used the survey method to collect data and study the concept of co-production. Eijk and Steen (2016) and Bandola-Gill et al. (2022) used qualitative studies to understand the concept of co-production. Rare studies that have used mixed method research include Price (2019) and Lee et al. (2022). The discussion above further supports the author's position that there is a paucity of research studies that have used mixed method research vis-à-vis co-production as a phenomenon. This is an important gap that needs to be addressed.

In summary, based on the above, it can be inferred that the literature concerning co-production and its relationship to value co-creation is a contested and sparsely addressed topic. This further leads to the conclusion that the current body of knowledge about these concepts is shallow, with additional studies needed to adequately elucidate hidden knowledge across different contexts.

2.8.2. Value-in-use

A plethora of recent research activities have focused on value-in-use as an important component/process that occurs during the wider process of value co-creation (Smaliukiene et al., 2015; Osborne et al., 2022; Carvalho et al., 2023). Conceptualisation of value-in-use can be traced back as early as 1776 when Adam Smith discussed the concepts of value-in-use and value-in-exchange (Vargo et al., 2008). From there on, the concept of value-in-use has been further discussed by many authors (Say, 1851; Mill, 1965). More contemporary thinking on value-in-use has been shaped, only recently, by Vargo and Lusch (2004) through their service-dominant logic. As a concept, value-in-use is inextricably linked to the value co-creation process (Vargo and Lusch, 2004).

Within the context of higher education, Leem (2021) argues that value-in-use occurs in the classroom; an argument that is corroborated by Brambilla (2016). Although the literature indicates that value occurs during the use of a service by a customer, there are counter views that state that value-in-use cannot create value by itself. For instance, Vargo et al. (2008) argue that while value-in-use drives value co-creation, such value is co-created when mediated by another concept called value-in-exchange. Furthermore, Brambilla (2016) argues that values are not simply created by a cause-and-effect relationship, or a simple interaction or relationship between variables. These arguments point towards the need to understand the concept of value from multiple perspectives, such as value-in-use, value-in-exchange, and value-in-context (Brambilla, 2016). However, this research relies upon the argument of Vargo et al. (2008) which states that value-in-use can exist without value-in-exchange in a value co-creation process, and that value-in-use and value-in-exchange can co-exist. Furthermore, it is argued that even though both value-in-use and value-in-context can be construed as part of the value co-creation process, this review focuses on the former (i.e. value-in-use) as one of the core constructs being investigated in this research.

The next section of this review discusses the definitions of value-in-use, followed by a section that contrasts value-in-use with value-in-exchange. These are followed by a review of the literature concerning the conceptualisations, and other aspects, of value-in-use that are deemed essential to this research.

2.8.2.1. Definition of Value-in-use

The following table (2.11) provides some of the definitions that are widely found in the extant literature.

#	Definition	Author(s)
1.	Value-in-use is the use by the customers of their usage experience to assess the value of a service or good.	Vargo and Lusch (2004), Ranjan and Read (2016)
2.	Value-in-use is considered as an outcome of a certain process that requires resources.	Chesbrough et al. (2018)
3.	Value-in-use is considered as a consequence of value co-creation and is an indicator of the co-created value.	Lusch and Vargo (2006)
4.	Value-in-use is a quantity that is specified and created by the consumer in the consumption process; and involved the participation of the consumer in the creation of service.	Witell et al. (2011)

Table 2.11: Definition of value-in-use (Source: Author)

The various definitions of value-in-use have one thing in common; that value-in-use occurs during, or after, the consumption of the co-created outcome. The concept appears to be still new, despite its roots tracing back to 1776, with research on value still at a nascent stage in many respects. It is important to recognise that the customer is the actor that derives value-in-use. Examples of value-in-use include:

- Within the classroom setting of an undergraduate programme, value-in-use is produced as the courses progress and students gain knowledge along the subjects the students are registered in (Brambilla, 2016).
- In a commercial setting, say an automobile showroom, there is no value produced by the car before the consumer drives the car. When the buyer puts together the ability to drive with the need to travel to a destination, then only can the car be said to incur value and value-in-use is seen in operation.

The discussion above provides some understanding as to what value-in-use, as a concept, could be. However, the literature still lacks empirical studies focusing on the concept of value-in-use in many settings, including social settings (e.g. educational institutions) (Stampacchia et al., 2015). The lack of research studies can raise questions as to the clarity of understanding surrounding the concept. Dollinger et al. (2018) argue that most researchers have focused on only one of the two co-creation phenomena, and not both. In other words, previous studies have focused on either value-in-use or value-in-exchange, which has resulted in a situation where the research outcomes have not been able to demonstrate the benefits accrued from co-created value (Ranjan and Read, 2016). These two gaps in the literature indicate that the current body of knowledge available with respect to value-in-use lacks depth. Following the discussion on the issues

concerning the definition of value-in-use, the subsequent section will compare and contrast value-in-use and value-in-exchange; two concepts that have been argued to co-exist during the process of value co-creation.

2.8.2.2. Value-in-use versus Value-in-exchange

As previously discussed, value-in-use and value-in-exchange co-exist in the co-creation process. A contrast between the two concepts is imperative to distinguish between the two, provide clarity, and eliminate any ambiguity in the understanding of the functions of the two concepts. The following table (2.12) provides a good view of the contradistinction between the two concepts.

#	Value-in-use	Author(s)	Value-in-exchange	Author(s)
1.	Happens at the time at which resources are used.	Eggert et al. (2018)	Happens at a time when resources are exchanged.	Eggert et al. (2018)
2.	Value is an outcome of the value co-creation process that consumes resources.	Chesbrough et al. (2018)	Value is encapsulated in the (exchanged) resources during the co-creation process.	Chesbrough et al. (2018)
3.	Value-in-use indicates that value is restricted to an actor applying the resources in a co-creation process that aims at achieving a valued goal.	Chesbrough et al. (2018)	Value-in-exchange indicates that value perceived by the receivers involved in the exchange process, of benefits in terms of the potential usefulness of the exchanged resource required to satisfy their needs.	Bowman and Ambrosini (2000)
4.	Resources (e.g. human resources) are considered as the sacrifices made by the actor and outcomes that are realized are the benefits.	Chesbrough et al. (2018)	The resource exchanged has a sacrifice (e.g. cost of purchase) and an anticipated benefit	Bowman and Ambrosini (2000)
5.	Focuses on the value that a participant involved in the value creation process creates through a use process.	Chesbrough et al. (2018)	It is a process of value creation achieved through resource exchange that takes place between actors.	Chesbrough et al. (2018)

Table 2.12: Contrasting between value-in-use and value-in-exchange (Source: Author)

Table 2.12 illustrates the distinct differences between the concepts of value-in-use and value-in-exchange. Given that this research requires a clear understanding of the concept of co-production in a classroom setting in a higher education institution, the focus will be on the value (co)created, through the teaching-learning process, in addition to its consumption by students. In other words, this research focuses on the value-in-use perspective, rather than the value-in-exchange perspective. This distinction clarifies that the value co-creation in this research considers the outcome of the result of value-in-use rather than its exchange. The next section focuses on the conceptualisation of value-in-use as found in the extant literature.

2.8.2.3. Conceptualisation of Value-in-use

Value-in-use is regarded as a derivative of value co-creation (Chesbrough et al., 2018). As a construct, value-in-use is conceived by researchers in different ways. Leem (2021), for example, used value-in-use as a mediating variable in an investigation of the relationship between co-production and student benefits in the higher education context. An alternative conceptualisation, by Macdonald et al. (2011), demonstrated that value-in-use is determined by customer perceptions of quality in the context of manufacturing units. The conceptualisation of value-in-use as a mediator was also found in the research work of Nunes et al. (2021) where value-in-use was conceptualised as a mediator that mediates between value co-creation and customer retention in the field of higher education. Jacob and Rettinger (2011) conducted an exploratory study on the role of customer co-production in value creation where they argued that value-in-use is an outcome of co-production. A similar study was conducted by Ballantyne and Varey (2006) to understand how creating value-in-use, through marketing interaction, can affect value creation. However, it is worth noting that the number of publications that have conceptualised value-in-use as a variable in different ways is very limited. A more detailed conceptualisation that elucidates an understanding of how value-in-use can be treated as a concept is provided in appendix IX, although such conceptualisations appear to simply define what value-in-use is, and not how it can practically be represented in empirical studies. This clearly indicates that empirical studies which have represented value-in-use as a variable in research are sparse (Medberg and Grönroos, 2020). This leads to the inference that the current depth of knowledge which can help in operationalising value-in-use as a variable is shallow. This is an important limitation surrounding research concerning value-in-use in relation to co-creation.

However, certain interpretation of the various conceptualisations provided in appendix IX can lend support in operationalising value-in-use as a construct in empirical studies. Additionally, the literatures evidences only a limited number of studies that demonstrate how value-in-use can be deployed as a dependent variable that is determined by co-production (Leem, 2021) and value co-creation (Nunes et al., 2021). It can also be seen that in these two research efforts, value-in-use is found to influence outcomes of value co-creation,

namely student benefits (Leem, 2021) and student retention (Nunes et al., 2021) in a higher education context. Those limited research outcomes do not provide adequate support to conceptualise value-in-use as a variable in research concerning value co-creation. This points towards the need for conducting further research on this topic. The limited research efforts that are found in extant literature are not sufficiently able to firmly establish whether the future research investigations that need to be conducted concerning value-in-use should adopt an objective or subjective ontological position, or both. Although Leem (2021) and Nunes et al. (2021) have used a quantitative research method, with use of a Likert scale survey instrument to measure value-in-use as a quantity, other research outcomes that have explored value-in-use are hard to find in the literature. Research evidence showing value-in-use to have been investigated using explorative studies, or mixed methods, is lacking. In the absence of an adequate number of studies that have used multiple research methodologies to examine the concept of value-in-use, it is difficult to draw conclusions on what the nature of value-in-use can be, and how to understand and operationalise it as a concept. This is an important gap in the literature. The importance of this gap lies in the implications for developing theoretical models and frameworks that conceptualise value-in-use for use by both researchers and practitioners in solving complex problems that could occur, while reaping the benefits offered by value co-creation in various spheres of life.

As for the relevant factors and their relationship to value-in-use, some examples can be found in extant literature. Jacob and Rettinger (2011) argued that co-production, by customers, leads to value-in-use. Leem (2021) argued that value-in-use is determined by co-production. Leem (2021) also postulated that value-in-use can drive student benefits. Furthermore, Chesbrough et al. (2018) argued that value-in-use leads to benefits for the customer. Moreover, Chesbrough et al. (2018) also argued that value-in-use leads to open innovation. These arguments suggest that value-in-use, as a concept, can affect a number of factors, and that there remains a dearth of research outcomes that have investigated all the factors that can be influenced by value-in-use. For instance, Nunes et al. (2021) suggest that factors, including customer loyalty and repurchase, could be studied as driven by value co-creation and value-in-use. Similarly, Leem (2021) states that other student benefit factors, such as online learning quality, need to be studied with regard to co-production and value-in-use. As such, it is reasonable to conclude that more research is needed to understand how value-in-use can affect other factors, in order to gain more holistic knowledge about the value co-creation process across different sectors, including the higher education sector.

2.8.2.4. Theoretical Concerns

With respect to the theoretical underpinnings and support available in the literature, researchers have used a number of theories to explain and operationalise the concept of value-in-use and its relationship to other factors. For instance, researchers have used the theory of experience-economy, service-dominant logic theory, social capital theory, social exchange theory and the theory of co-production in explaining the relationship between co-production, value-in-use, and student benefit(s) (Parks et al., 1981; Vargo and Lusch, 2008; Ranjan and Read, 2016; Dollinger et al., 2018; Dziewanowska, 2018; Leem, 2021).

The concepts drawn from the service-dominant logic, co-production theory, social exchange theory, and the experience-economy have been used to explain value-in-use and its relationship with co-production. However, the relationships concerning value-in-use and student benefits have only been explained using the service-dominant logic, social capital theory, social exchange theory, and the experience-economy theory. In the previous sections concerning theories (sections 2.7), the usefulness of the different theories for explaining the relationships between various constructs that could contribute to value co-creation (such as co-production and value-in-use, as well as value-in-use and student benefits) has been critically reviewed. It is important to note that the theoretical support for explaining, and operationalising, the various constructs contributing to value co-creation and the relationships amongst them is relatively well addressed in the extant literature. However, the issue of how a combination of theories could be applied in research efforts concerning value co-creation is still a challenge, as there could be situations where two theories - though appearing to provide support and explanatory power - could end up opposing the relationship between those constructs. Hence, it is important to understand the basic concepts posited by those theories, with careful and consistent application to explain specific constructs, the central concept under study, and the relationships amongst those constructs.

It is evident that the concept of value-in-use is nebulous and not well addressed in extant literature, especially with regard to its conceptualisation and operationalisation in empirical studies. This review has highlighted the gaps that exist in the literature. These gaps need to be addressed by researchers interested in examining the concept of value-in-use and its relationship to the various factors that purportedly contribute to value co-creation.

2.8.3. Individual Innovative Behaviour

Innovation, as a concept, can be considered as being a co-created outcome in the value co-creation process. Professors and students are an indispensable part of the co-creation of innovation (Haput and Antonites, 2020). Furthermore, although the concept of innovation has been widely discussed in extant literature,

transformation affecting technologies (e.g. digital technologies) are argued as having an effect on innovation (Loonam et al., 2018). The uncontrolled proliferation of digital technologies, coupled with the advent of the fourth industrial revolution (I4.0) are seen to be disrupting current business models. New organisational models are needed to answer the calls of the United Nations sustainable development goals, which in turn is leading to increased attention being afforded to innovation as a driver for sustainability (Loonam et al., 2018; Tolstykh et al., 2020). Problems associated with sustainable development are becoming a challenge, which is driving organisations to turn to innovation in an effort to safeguard and sustain their competitive advantage (Li et al., 2023). This in turn affects innovation behaviour at the individual and organisational level (Lukes and Stephan, 2017). Employee innovation is now under greater focus, wherein new studies are emerging with a focus on innovation work behaviour or innovation behaviour of employees (Hero et al., 2017). Some studies indicate that organisations are now facing challenges in finding potential innovative behaviour in employees (Spännäri et al., 2023). One reason for such could be the negative trends related to value creation in industry in OECD countries (Avvisati et al., 2013), which has the potential to demotivate employees to be innovative. Within the higher education setting, many HEIs lay claims to innovation, with some espousing innovation as a core value. However, educating learners to be truly innovative and capable of generating meaningful innovations that serve innovative economies is considered a challenge (Avvisati et al., 2013).

2.8.3.1. The Concept of Innovation Behaviour

The terms innovation and innovativeness are widely featured in the research of many scholars, especially as of the last few decades (Spännäri et al., 2023). While innovation refers to creativity (e.g. producing new ideas), innovative behaviour is indicative of the implementation of innovation (e.g. application of newly generated ideas or knowledge or enhancing of processes).

Given that the focus of this research is on value (co)creation, behavioural aspects naturally come into the fore in the discussion. Both the terms innovation and innovative are discussed from the behavioural perspective. Furthermore, this review will focus on innovation behaviour with regard to the context of educational institutions. This is important due to the questions relating to how and to what extent students can be educated to be innovative, through application of value-co-creation, to achieve synergistic outcomes.

2.8.3.2. Value Co-creation and Innovation in the Classroom

The concept of value co-creation is finding relevance and increased attention in relation to higher education (Nguyen et al., 2021). There is evidence to suggest that the value co-created in higher education affects innovation. Nguyen et al. (2021) found that value co-creation directly and positively influences word-of-

mouth about an institution, which is influenced positively by the innovation experience of the learners. Additionally, the literature suggests that co-production is linked to innovation in a classroom setting, through the interaction between faculty and students, where students and faculty share experiences (Ramirez, 1999). Furthermore, innovation experience of students is found to affect student benefits. For instance, Micheal and Marjadi (2018) argued for enhancing the innovativeness of students by HEIs, as this would increase their employability and job prospects.

The abovementioned arguments point towards the concepts of value co-creation, co-production, and student benefits as being interlinked. Nevertheless, the concept of value co-creation itself is still found to be relatively new in the context of higher education. The literature indicates a dearth of well investigated conceptual models. There is considerable space for further exploration, as the gaps remain very broad (Díaz-Méndez and Gummesson, 2012; Elsharnouby, 2015). Furthermore, student behaviour is an important aspect that appertains to innovation. For instance, the literature provides evidence to suggest that for innovation to occur, certain factors need to be at play. The individual factors, task context and social context, play a role in innovation behaviour (Anderson et al., 2014). In a similar vein, de Jong and den Hartog (2010) argue that individual innovation behaviour is all about idea generation, development of new products and services or processes, improvements in the existing processes used at the workplace, and re-organising and combining current thinking related to problem solving. Other researchers argue that innovation behaviour is concerned with ideas, processes, products, and procedures that are new, novel, and worth adoption in organisations (Scott and Bruce, 1994; de Jong and den Hartog, 2010). Whether these factors could be instilled in a student, as individual innovation behaviour, in a university, is an important question that is not answered in the literature, especially when value co-creation is at the centre of the investigation. In fact, some scholars have studied the relationship between universities and students in the co-creation process, taking into account the different perspectives, including various kinds and characteristics of educator – student resource interactions. Those studies revealed that the faculty-student relationship constitutes a collaborative process. Some researchers have described such collaboration in terms of partnership. However, it is not easy to achieve such partnership between faculty and students, as this is seen by some to inundate the typically accepted relationship between faculty and students (Lipponen and Kumpulainen, 2011; Cook-Sather and Luz, 2015). This is a gap in the literature, which points towards the fact that relating individual innovation behaviour in such a collaborative partnership-like manner can be challenging, particularly when one considers the factors that affect innovation behaviour as mentioned above.

Another important consideration that requires attention is the issue of resources available to a student in a higher education institution. These resources form one of the inputs for innovation behaviour, and the lack

of knowledge vis-à-vis the resources could act as another limitation that will surround the understanding of the relationship between value co-creation and individual innovation behaviour. For instance, student resources include intelligence of the student, the ability to learn, the various habits students have to study, methods those students use for study, sense of responsibility, and personality and individual perspectives and opinions (Díaz-Méndez and Gummesson, 2012). This implies that if those student resources are available, then there is a better possibility for students to co-create value (Nguyen et al., 2021). In the same vein, it logically follows that innovation behaviour would also need those resources for a person to be innovative (Valaei et al., 2017). However, whether these resources alone can produce innovation behaviour in students as part of the process to co-create value is not clear (Nguyen et al., 2021). This is another gap in the literature.

With the view of HEIs instilling innovation behaviour in students, certain theories need to be relied upon. These theories should explain and account for the behavioural aspects involved. One of the theories that is found to be useful here is the creativity and innovation theory propounded by Amabile (1996). This theory is also called the componential theory of creativity (Amabile, 1996; Valaei et al., 2017). According to Amabile (1996), in any organisation the successful implementation of creative ideas is considered as innovation, and creativity is defined as the generation of new, unique, and useful ideas in any field. Application of this theory to the concept of innovation behaviour will clearly require students to generate new, unique, and useful ideas in any field, and that the university should provide a channel for those ideas to be implemented. As such, it is possible to argue that when the teaching – learning interaction takes place in a classroom unique ideas are expected to be produced by students due to their creative behaviour. The outcome of this creativity could manifest in various ways where innovative behaviour is practiced by students. This innovation behaviour, driven by the creativity of students, through classroom interaction between faculty and students, needs to be defined.

The componential theory explains the occurrence of innovation behaviour, as based on students' creative behaviour inculcated in the classroom. The definition of the innovation behaviour could be explained by the S-D logic theory (Vargo and Lush, 2016). For example, classroom interaction can generate creative ideas, but implementation of such ideas requires resources and innovation on the part of the students. The generation of the new ideas is the expected outcome of the classroom interaction, but the individual innovation behaviour of the students to find new and novel ways to implement the idea, for instance commercialisation of the ideas, is not typically part of the expected outcome. This is defined as the value co-created inside the classroom, and S-D logic theory provides the basis to explain this phenomenon (Vargo and Lush, 2016). Fan and Luo (2020) support this argument and state that S-D logic provides the basis to

explain the phenomenon of value co-creation when open innovation occurs in institutions. However, the exchange of ideas and experience between professors and the students that generates creative ideas in the minds of students needs to be explained. To this effect, researchers have suggested the use of social exchange theory. Janjua et al. (2021) argue that commitment to continue a relationship with an organisation, when value co-creation occurs, is generally explained by social exchange theory. When this argument is applied to the classroom setting, obtaining a committed relationship between faculty and students might pose a challenge. The application of social exchange theory could provide some support to explain how to create a committed relationship, or partnership, between faculty and students. This needs to be tested, whereby the generation of creative ideas inside a classroom, through faculty-student relationships, would be expected to produce value in the form of innovation. The production of such innovation behaviour, taken as a consequence of the value expected to be co-created in the exchange process, between the faculty and students in a classroom, needs to be explained by another theory. This could be explained by co-production theory. One of the conditions stipulated by Ostrom (1996) is:

- During interactions between two people, build a credible commitment which will lead to a situation wherein when one person increases the input, the second person interacting with the other will continue at the same or higher level of input provision (Condition 3).

This theory could be used to explain the production of innovation behaviour as an outcome that is co-created through the committed interaction between instructor and student in a classroom setting. This argument is supported by Chatterjee et al. (2021), although as applicable to the context of industry, not education. However, the application of this theory to explain what could happen when innovation behaviour is co-produced is not explained in the literature. An example of this could be seen in the research work of Chatterjee et al. (2021) who did not use the theory of co-production while assessing consumers' co-production and future participation on value co-creation and business benefit. Accordingly, there is a need to examine how the co-production of innovation behaviour could be explained in a classroom setting within a higher education institution using the theory of co-production.

2.8.3.3. Conceptualisation of Individual Innovation Behaviour

The literature indicates that most of the conceptualisations of innovation behaviour of people in organisations is organised under the terms innovative behaviour (Yepes and López, 2023), individual innovation behaviour (Strobl et al., 2020) and innovative work behaviour (de Jong and den Hartog, 2010). Conceptualisation of individual innovation behaviour includes representation of relationships between individual innovation behaviour, or innovative behaviour, or innovative work behaviour, on the one hand, and co-production (Lusch and Vargo, 2008; Dollinger et al., 2018; Dziewanowska, 2018), value-in-use

(Lusch and Vargo, 2008; Dollinger et al., 2018; Dziewanowska, 2018), student benefits (Lusch and Vargo, 2008; Penttilä and Kairisto-Mertanene, 2012; Dollinger et al., 2018; Dziewanowska, 2018) and competence (Penttilä and Kairisto-Mertanene, 2012) aspects on the other.

The concepts of individual innovation behaviour, innovative behaviour, and innovative work behaviour are found to signify and mean the same thing. However, they are operationalised in different ways. For instance, Yepes and López (2023) posit innovative behaviour as a dependent variable when examining the topic of knowledge-sharing capability in innovative behaviour in the higher education sector. Strobl et al. (2018) operationalised individual innovation behaviour as an independent variable influencing exploration and exploitation. Waheed et al. (2022) operationalised innovative work behaviour as a mediator in their research on work engagement and organisation performance in the context of manufacturing industries. Al-shami et al. (2023) conceptualised organisational innovative culture as an innovative behavioural construct, moderating between happiness at the workplace and innovative work behaviour on the one hand, and between happiness at the workplace and organisation citizenship behaviour on the other. The conceptualisations and operationalisations of the construct of innovation behaviour (or innovative or innovative work behaviour) in extant literature demonstrates that researchers have conceptualised the consturct varyingly. The lack of consensus leads to the inference that this construct could be examined as part of any theoretical model in variable ways depending on the nature of the study. However, this has the potential to create conceptual tensions that need to be resolved by researchers at the time of conceptualising the construct. Researchers need to be aware of this possible pitfall in dealing with individual innovation behaviour as a variable. Additionally, this construct has been combined with other concepts, and studied using both explanatory and exploratory methods. For instance, Strobl et al. (2018) studied individual innovation behaviour as a construct using an explanatory method. Whereas Haupt and Antonites (2020) conducted an exploratory study of innovation behaviour in the context of higher education. Lei and Hock (2020) used a mixed method approach to study the enhancement of innovation capability using entrepreneurial education. These examples highlight the need to carefully select an appropriate and adequate research method. Furthermore, previous research efforts indicate a certain amount of ambiguity in relation to whether the construct should be measured quantitatively, or explored qualitatively (Anderson et al., 2014). For instance, Scott and Bruce (1994) used a five-point Likert scale to measure individual innovation behaviour. Similarly, Li et al. (2023) have also used a five-point Likert scale survey method to measure employee innovation. Although there is no consensus on a single tested and validated instrument that could be used to measure individual innovation behaviour, the literature provides some useful examples, which researchers could examine and adapt for their research purpose.

The discussion above provides a comprehensive review of the concept of individual innovation behaviour. It is evidenced that the behavioural aspect, concerning innovation, has been discussed under the terms innovation behaviour, innovative behaviour and innovative work behaviour. The literature shows that these terms have been interchangeably used. The concept itself appears to be under-studied in the context of the higher education institutions, especially in a classroom setting, as related to the value co-creation process. This is an important gap in the relevant literature. The lack of an understanding as to how individual innovation behaviour is co-created in the classroom, during the teaching – learning process, is vital to the present world where innovation is highly sought after. Therefore, it is reasonable to conclude that any investigation of the concept of individual innovation behaviour, in a classroom setting, within the context of a higher education institution, will add to the body of knowledge concerning value co-creation.

2.8.4. Student Benefits

The concept of student benefits, as derived out of value co-creation, is well discussed in extant literature. Examples of student benefits include quality interactions, greater satisfaction, and advanced graduate capabilities (Dollinger et al., 2018). There is clarity in the literature on the accrual of benefits to customers (Dean et al., 2016) through the process of value co-creation (Díaz-Méndez and Gummesson, 2012; Dollinger and Lodge, 2018; Gunarto and Cahyawati, 2022). However, there is a lack of clarity as to the understanding of such benefits that accrue, and what they might constitute, as a result of the value co-creation process that occurs in a classroom setting as situated in a higher education institution context (Leem, 2021). The literature also indicates that value co-creation is a new phenomenon in higher education institutions, and there are significant underexplored aspects that are still under or uninvestigated, as related to the relationship between value co-creation elements and student benefits or performance (Leem, 2021; Nguyen et al., 2021). There is a paucity of research publications in the extant literature that have investigated student outcomes and benefits derived through the value co-creation framework (Ranjan and Read, 2016; Dollinger and Lodge, 2018; Dziewanowska, 2019). This implies that more investigations are needed to understand the nature of the relationship between the value co-creation process and student benefits that occur through the value co-creation concept in universities.

2.8.4.1. Conceptualisation of Student Benefits

The literature shows that benefits derived out of a co-creation process can be explained through the S-D logic theory, which posits extra value in the two-way delivery of the service (Vargo and Lusch, 2014; Leem, 2021; Gunarto and Cahyawati, 2022). This indicates that value co-creation elements, including co-production, value-in-use (Leem, 2021), and innovation behaviour (Jhantasana, 2022) could be argued as influencing those benefits derived by students. However, conceptual models that have used student benefits

as a construct comprising specific quantities of those benefits, as derived out of the value generated by value co-creation are sparse (Leem, 2021). The need for understanding student benefit as a construct arises out of the fact that there is a lack of understanding as to how, when, and to what extent students could derive, and enjoy, those benefits. For example, Fuentes et al. (2019) argue that projects undertaken by an industry may not provide valuable outcomes to clients in the medium and long-term. This suggests that value co-created through the interaction between that industry and its client(s), and the outcome expected to be derived by the client(s), may not be beneficial to the client(s) until after the passage of some time. An immediate example of this could be student satisfaction that is a co-created outcome, emerging through study at a university. Such satisfaction could only be beneficial to that student after he/she graduates and becomes gainfully employed. Although there are claims in the literature that value-co-creation influences benefits derived by the students after the value has been used by the students, nevertheless there are counter claims that state that students are unaware of certain benefits or values which may continue to emerge as the interaction goes on (Díaz-Méndez and Gummesson, 2012; Dean et al., 2016).

Extant literature shows that student benefits could be conceptualised as a construct that represents a group of individual benefits or a single benefit. Leem (2021) represented student benefits as a single construct that encompasses student immersion and student satisfaction, as viewed from the student's perspective. Whereas Jhantasana (2022) conceptualised student loyalty as the benefit viewed from the higher education institution's perspective. The literature also shows that the conceptual boundaries and their demarcation vis-à-vis the terms outcome of value co-creation, and benefits to the customer, are all blurred. For instance, Grönroos and Gummerus (2014) argue that the final outcome of a value co-creation process is the creation of value, or value-in-use, by the customer. This occurs as a result of bringing together and integrating relevant resources during the co-creation experience. This implies that the outcome of co-creation can be construed as value or value-in-use. However, Dean et al. (2016) argue that with transformational services, where co-creation is expected to occur, customers obtain value by drawing on the benefits of co-creation. If one takes into perspective the two arguments of Grönroos and Gummerus (2014), and Dean et al. (2016), together, then any delineation between outcome of value co-creation and customer benefits seemingly vanishes, and the outcome as well as benefit appear to be the same. As such, it is possible to argue that the outcome of the value derived out of the value co-creation process, or the outcome of the value, used by the customer while engaged in the value co-creation process, and the benefits derived by the customer by consuming the value co-created, could represent a single phenomenon.

Furthermore, there are plenty of cases in the literature that show that benefits accruing out of the value co-creation process have been conceptualised as a dependent variable that is influenced by either value-co-

creation as an independent variable, or different components of co-creation, such as co-production, innovation behaviour, and value-in-use. Chatterjee et al. (2021) conceptualised business benefits as driven by intention of value co-creation. Dean et al. (2016) conceptualised the co-creation experience of students as affecting independent value creation in the context of the education sector. Gunarto and Cahyawati (2022) posit that co-creation influences experience value and alumni loyalty in the context of the education sector. However, Raza et al. (2022) posit that co-created value is the determinant of benefit, in the context of the education sector, and argue that an institution's image, awareness about the institution, and experience gained in the institution, determine student volunteer behaviour; which is the benefit that students derive. Furthermore, Jhantasana (2022) tested a conceptual model that linked co-production and value-in-use as determinants of student loyalty.

One key observation in the research conducted by Jhantasana (2022) is that both co-production and value-in-use have been argued to influence the values co-created, namely student satisfaction and university image, which in turn affect the student benefit, namely student loyalty. While the literature has posited that student satisfaction, university image, and student loyalty, as constructs considered to represent value co-created, Jhantasana (2022) has deviated to posit student loyalty as the eventual benefit a university could derive from the co-creation process. Jhantasana (2022) did not consider both student satisfaction and university image as the benefits a university derives from the value co-creation activity in a university. Another important position taken by Foroudi et al. (2019) is that value co-creation behaviour influences both university image, and university reputation, which are considered as benefits for an institution. These inconsistencies in the literature lead to a lack of clarity as to the understanding of the concept of student benefits. In addition, it is also seen that much of the literature argues that benefits that could accrue though the value co-creation behaviour of students are conceptualised as benefits accruing to the university not the student (Foroudi et al., 2019; Gunarto and Cahyawati, 2022; Jhantasana, 2022). Except for those publications, such as the one produced by Leem (2021), it is a rarity to come across any research that considers the student's perspective vis-à-vis benefits. Moreover, there is no clarity as to how one can operationalise student benefits in the literature. Foroudi et al. (2019) operationalised university image as influencing university reputation. The researchers hold that this implies that one student benefit is influencing another. However, if one considers the argument of Jhantasana (2022), it can be said that the benefits emerging from the value co-created by students, namely student satisfaction and university image, can further influence the student loyalty, which is another benefit. If one takes into account these arguments, it is possible to assert that operationalisation of the concepts of value, value-in-use, outcome, and student benefit is completely confused in the literature. Further investigations are undoubtedly an imperative. There

is a need for greater clarity as to how one can operationalise the constructs that are derived out of the value co-creation process in a university.

The literature indicates that value co-creation behaviours, such as innovation behaviour, are adequately examined as antecedents of student benefits. Ramaswamy and Ozcan (2014) posited that co-production could lead to development of innovation behaviour in customers. However, it is hard to come by any conceptualisations in the literature that link innovation behaviour to student benefits. This is a clear gap in the literature.

The literature indicates that researchers have applied multiple theories to understand and operationalise the concept of student benefits. For example, the relationship between co-production and student benefits has been supported by the theories of co-production and experience-economy (Etgar, 2008; Yi and Gong, 2013; Dziewanowska et al., 2016; Prebensen et al., 2016; Ranjan and Read, 2016; Dziewanowska, 2018; Leem, 2021). The experience-economy theory explains the creation of experiences for student in terms of economic value created by co-production, in addition to the experience dimension of value-in-use. Co-production itself has been explained by the theory of co-production which produces student benefits. However, the relationship between value-in-use and student benefits has been supported by the theory of experience-economy, S-D logic theory, social capital theory, and the theory of co-production. Value-in-use is purported to produce social capital. As for the relationship between individual innovation behaviour and student benefits, the literature suggests that it is possible to introduce the concepts of the Innovation Competencies Development (INCODE) Barometer, S-D logic theory, and social-exchange theory (Lusch and Vargo, 2008; Penttilä and Kairisto-Mertanene, 2012; Dollinger et al., 2018; Dziewanowska, 2018). Although S-D logic theory explains the generation of co-created outcomes such innovation behaviour, social exchange theory is expected explain the way innovation behaviour and student benefits are exchanged between the university and students. Penttilä and Kairisto-Mertanene (2012) use the underlying concepts of the INCODE barometer to measure innovation behaviour. These arguments demonstrate that no single theory, used alone, is sufficient when explaining the concept of student benefits and its relationship to other components of value co-creation. This represents a challenge that goes to the heart of the central focus of this research. However, it is acknowledged that application of different theories to a single relationship between two constructs could potentially give rise to conflict between the two theories.

Furthermore, a number of researchers have evidently adopted both explanatory and exploratory research methods to understand and explicate student benefits as a construct. For instance, Jhantasana (2022), Gunarto and Cahyawati, (2022), and Foroudi et al. (2018), all conducted explanatory studies that used

survey instruments to measure the phenomenon of student benefits. Whereas Díaz-Méndez and Gummesson (2012) conducted an exploratory study to understand value co-creation and university teaching quality, which includes a study of the benefits derived out of value co-creation. Thus, it is clearly evidenced how different methods have been applied by different researchers towards gaining an understanding of the concept of student benefits, as accrued out of the process of value co-creation process. The adoption of a particular research method is contingent on the research problem a researcher is investigating.

The preceding discussion points toward important gaps in the literature vis-à-vis the construct of student benefits in an environment characterised by value co-creation (e.g. in a classroom in a higher education context). The conceptual issues suggest a lack of clarity in understanding what could be a benefit in a co-creation process. Additionally, some theoretical challenges come into the fore, whereby the application of multiple theories is seen to be necessary for explaining the various relationships that could be conceptualised in relation to the construct. The literature is silent on whether student benefits, as construct representing benefits accruing out of the process of value co-creation, should be an integrated component of many benefits, or whether one benefit can be construed as affecting another benefit. Further still, except for very rare instances (e.g. Raza et al., 2022), it is very hard to find any instance of research in extant literature in which student benefit is conceptualised as an independent variable. However, there are examples wherein some researchers have conceived of student benefits as a mediating variable (Gunarto and Cahyawati, 2022; Jhantasana, 2022); although those researchers have conceptualised one benefit as influencing another (benefit), as opposed to a value co-creation component influencing student benefits. Thus, these issues in the literature necessitate further attention. Further research is informed to find some resolution to those issues.

2.8.5. Innovation Competency Skills as an Antecedent of Individual Innovation Behaviour

That occurrence and manifestation of innovation behaviour in a classroom is widely accepted. However, it is not clear how it could be co-created as an outcome of the value co-creation process in the classroom (Jhantasana, 2022). Innovation, as a concept, is arguably supported by the concept of competence; an argument that is agreed on by other researchers (Keinänen and Kairisto-Mertanen, 2018). An important conceptualisation that is useful toward understanding the importance of competence for innovation is the term innovation competency skills, which will be used in this review.

#	Definition	Author(s)
1.	Innovation competence is defined as the capacity to produce original, appropriate and implementable solutions to problems.	West and Farr (1990)
2.	Innovation competence is all about creativity, entrepreneurship, integrating perspectives, forecast and change management.	Boza et al. (2014)
3.	Innovation competence is the capacity to bring out new ideas that are implementable to successfully create products, or services, or procedures, or theories, or strategies that are tangible and/or purposeful to the audience aimed at.	Tidd and Bessant (2009)
4.	Innovation competence focuses on creativity skills.	Keinänen and Kairisto-Mertanen (2018)
5.	Innovation competence represents a set of individual characteristics, knowledge, skills and attitudes which are connected to the formation of a firm and implementable novelty or novelties by collaborating in complex innovation processes.	Bruton (2011), Peschl et al. (2014)

Table 2.13: List of definitions of innovation competence

The various definitions provided in table 2.13 demonstrate that innovation competence encompasses numerous aspects. Creativity and novelty, or new ideas, appear to be two of the main aspects common across the various definitions. In other words, the concept of innovation competence is influenced by creativity and new or novel ideas. However, there are other aspects that are relevant to innovation competence, such as implementable original solutions to problems, entrepreneurship, change management, and creation of products and services useful to a targeted audience. These aspects make the concept of innovation competence more complex. Furthermore, the problem becomes even more complex when the concepts of innovation behaviour and innovation competence are dealt with together and linked to each other (Glassman and Opengart, 2016; Strobl et al., 2020). When two complex issues are involved, the concepturalisation of variables, and the models emerging from a combination of those issues becomes a challenge. Within this context, the following section conceptualises the concept of innovation competency skills as a construct.

2.8.5.1. Conceptualisation of Innovation Competency Skills

Previous studies suggest that innovation behaviour is an important part of the innovation process (Bruton, 2011; Peschl et al., 2014). The co-creation of innovation behaviour is also considered associated with the

innovation process (Chatenier et al., 2010; Takahashi and Takahashi, 2021). This implies that innovation behaviour, innovation competency skills, and value co-creation, are interrelated. However, the literature does not provide any explanations for such interrelation, and how all these concepts manifest and interplay in a classroom setting. Based on the preceding discussions, it is reasonable to infer that the definitions provide some clarity vis-à-vis the concept of innovation competence and its direct relationship with innovation behaviour, in addition to the indirect relationship with value co-creation. However, the lack of congruence amongst the various definitions creates some difficulty for the researcher when choosing a particular definition, from the many that are available in the literature, for the purposes of application in a particular research study.

The definitions provide an understanding of innovation competence as a general concept, although specific components are not well understood. For example, within the definitions of innovation competence, there is mention of creativity skills as an important contributor. The influence of these skills on innovation competence is significant for the understanding of how innovation competence contributes to innovation behaviour (Özbağ, 2013; Charosky and Bragós, 2021). In fact, the literature shows that only a few approaches have been researched to understand students' innovation competence in a broader sense (Chang, 2014; Edwards-Schachter et al., 2015; Kasule et al., 2015; Hu et al., 2016). Additionally, the literature includes claims that research related to students' innovation competences has not gone beyond studying generic and soft skills (Ballantine and Larres, 2007; Virtanen and Tynjälä, 2018), professional competence (Kantola et al., 2005; Chang et al., 2007; 2009) and entrepreneurship (Achcaoucaou et al., 2012; Taatila and Down, 2012; Keinänen and Kairisto-Mertanen, 2018). This suggests that there could be other skills that have not been investigated yet. Hence, the available body of knowledge about student innovation competency skills can be said to lack depth, as there could be more components of those skills that have not been investigated yet. This constitutes a gap in extant literature. As such, based on the preceding discussions, and given the central focus of this research which revolves around the role of student innovation behaviour in the co-production process, it is reasonable to infer that there is a need to further investigate the concept of innovation competency skills and the components it comprises.

Although it is acknowledged that innovation competency skills comprise a number of components, it is necessary to limit the investigation to a finite number of components to ensure that the research has focus, a finite scope, and practicability. Previous studies suggest that critical thinking, teamwork, analytical competence, problem solving, creativity, communication & negotiation competence, and intercultural competence form part of the main concept of innovation competency skills (McPhillips et al., 2022), individual competency skills, interpersonal competency skills and networking competency skills (Watts et

al., 2013; 2014). Including all those components in one research would render the study impractical. It would also have the potential to distract from the focus of the study, going beyond the original scope of this research, which is the investigation of value co-creation in a classroom setting - not innovation competency skills. Innovation competency skills are just one part of the overall research. Hence, only three such components have been chosen for this study. These components are individual competency skills, interpersonal competency skills, and networking competency skills (Watts et al., 2013; 2014). Although the focus is on those three competencies, some other related skills are dealt with as part of the three competency skills mentioned above; the rubric for which can be seen in the publication of Watts et al. (2013; 2014). Furthermore, these skills were identified for investigation in this research because of the recommendation of researchers like Watts et al. (2013; 2014) who developed the innovation competency framework called INCODE (Innovation Competencies Development project) based on the aforementioned skills. In recent years, INCODE has started to gain widespread recognition amongst researchers. Another reason for including those three competencies in this research is due to the fact that those competencies have direct bearing on individual innovation behaviour. Competency indicates behavioural aspects (McPhillips et al., 2022) and the INCODE framework captures innovation behaviour. Consequently, there is justification for reviewing those three competencies as juxtaposed with individual innovation behaviour. It is expected that the review of the three innovation competency skills will be sufficient to demonstrate the influence of those collective skills on individual innovation behaviour, hence value co-creation in a classroom setting. It is expected that the results of the investigation will shed light on the importance of the influence of innovation competency skills in general as antecedents of individual innovation behaviour. The outcome of this investigation could be useful to study other components of innovation competency skills that are not included in this research.

Previous studies indicate that the innovation competency skills' equation posited by Penttilä et al. (2011; 2012) provides a clear link between the three competency skills mentioned above and the innovation competency construct. This is depicted in figure 2.5.

Figure 2.5: Construction of innovation competence model (Source: Penttilä et al., 2011; 2012)

The model in figure 2.5 provides a basis for linking the three competency skills. However, implementation of such a model in practical terms could be pose a challenge, as new assessment methods required to evaluate the competencies may need to be developed (Watts et al., 2012). The following sections will present a more details review of the literature vis-à-vis each of the three skills used in this study.

2.8.5.2. Individual (Personal) Competency Skills

One of the important competency skills that explains exhibition or demonstration of individual innovation behaviour, as an antecedent of individual innovation behaviour, is individual or personal competency skill (Penttilä et al. 2011; 2012; Ovbiagbonhia et al., 2019). It is described as an individual's capacity as related to aspects such as creativity, persistence, risk taking, and personal outlook (Marín-García et al., 2013). In a classroom creativity, persistence, risk taking, and personal outlook can be either seen as part of a student's capacity, or that capacity can be built into those students who do not possess, or students can be supported to possess that capacity. In fact, within the context of individual competency, the process of generating new ideas and applying those ideas in practice is not the same. They differ. Innovative thinking and responses are required to tackle critical incidents, problems, and tasks, to overcome challenges that may arise (Cerinšek and Dolinsek, 2009; Berdrow and Evers, 2010).

As for the relationship between individual competency skills and the innovation behaviour of people, it is evident from the literature that the former influences the latter. However, there is an evident paucity of studies that have investigated the innovative capacity of individuals, methods to evaluate such innovation capacity, and ways to further develop it (Cerinšek and Dolinsek, 2009; Marín-García et al., 2013). The situation is even more precarious in HEIs where there is a dearth of research efforts that have investigated how individual competency can contribute to innovation behaviour as a co-created outcome in a classroom setting. Accordingly, the relationship between individual competency skills and individual innovation behaviour warrants further study. However, there is some evidence in the literature to suggest that a linkage between individual competency dimension of students and the innovation behaviour could exist (Marín-García et al., 2013). There is also evidence that indicates that innovation behaviour can be treated as a co-created value in the classroom (Özbağ, 2013; Charosky et al., 2021). The preceding discussions provide support to the argument that individual competency skills could spur individual innovation behaviour as a co-created value that could manifest in a classroom setting. Examples of such individual competency skills include creativity, entrepreneurship, communication and networking, open mindedness, risk taking, and self-efficacy in digital skills (McPhillips et al., 2022; p.2).

Two important facts emerge from the preceding discussions. First, there is a possibility that individual competency skills can influence individual innovation behaviour. Second, individual innovation behaviour can be co-produced in a classroom setting, as part of the value co-creation process, in a learning environment as affected by the individual competency skills. However, to what extent individual competency can influence individual innovation behaviour, where co-creation of innovation behaviour is developed through co-production, is an area that is not addressed in the value co-creation literature. The theoretical support for defining individual competency behaviour relies on the INOCODE Barometer as a model that provides support for its conceptualisation. Furthermore, S-D logic theory could be applied to explain any change that occurs to the value of the innovation behaviour co-created throughout the learning process in the classroom. An advantage of the INCODE Barometer resides in the empirical measurement scale it provides for measuring individual competency skill. However, the INCODE Barometer has been criticised for not addressing its psychometric properties explicitly, which raises a question mark as to the validity of its psychometric properties (Marín-García et al., 2016). Inspired by the INCODE Barometer, other researchers have developed an improved version called FINCODA (Framework for Innovation Competencies Development and Assessment) by Marín-García et al. (2016) that purportedly overcomes the limitation of the INCODE Barometer. However, Charosky et al. (2022) argue that the INCODE Barometer is useful for application in the higher education context when measuring the innovation competence of students, while FINCODA is more suitable for measuring the innovation competency of entrepreneurs.

Previous studies, such as that of Marín-García et al. (2013), conceptualised individual competency skills as an independent variable that influences individual innovation. Similarly, Sari et al. (2023) argue that competency influences many aspects of an organisation including performance, which is related with behaviour. However, those representations do not take into account the role of individual competency skills in the value co-creation process. This constitutes a gap in the literature.

Yang et al. (2017) posited that competencies could act as mediators between training and task performance. This implies that students, if trained, can gain competencies, hence, perform tasks as innovators. In a classroom setting, the interaction between the professor and the student can lead to training of the students, who may, or may not, originally have individual competency skills. Through teaching and learning in the classroom, students can become innovators during the course of their studies at university. There is also evidence in the literature to suggest that competencies of individuals are determined by other factors, which indicates that individual competencies can be predicted conceptually. For instance, Mah and Ifenthaler (2018) argue that first year university students' expectations are linked to academic competence research

skills. In a similar vein, Brandão et al. (2012) posited that learning strategies at work influence expression of management competencies in the context of banks. These examples show that the concept of individual competency skills is differently conceptualised in the literature. Accordingly, it is reasonable to assume that the operationalisation of individual competency skill depends on the perspective with which a researcher approaches the topic. For instance, in this research study, it is argued that the innovation behaviour of an individual can be determined by individual competency as a factor. As such, the conceptualisation and operationalisation of individual competency will be as an independent variable that influences the concept of individual innovation behaviour.

Furthermore, it is observed that the concept of value co-creation has not been addressed in the studies cited above. However, there are cases of studies that have dealt with value co-creation with regard to the concept of competencies. For instance, Jhantasana (2023) argued that value in co-creation is found in the academic competence of students. In a similar vein, Waseem et al. (2018) posited that the competence of an individual plays an important role in value co-creation and can serve to optimise this process. However, Waseem et al. (2018) highlighted that individual competence - as a construct that can co-create value - has only been investigated at the macro level. It is observed that in-depth studies that have investigated individuals and their competencies vis-à-vis an organisation's operant and operand resources in the value creation processes are sparse (Waseem et al., 2018). This is points to a gap in the literature. As far as measurement of individual competency skill is concerned, researchers have used quantitative (Jhantasana, 2023), qualitative (Takahashi and Takahashi, 2020) and mixed methods (Waseem et al. 2018). This demonstrates that the articulation of research questions play an important role in determining the method of measuring the concept of individual competency skills and its relationship to individual innovation behaviour. One of the widely used measures employed by researchers adopting quantitative research is the INCODE barometer developed by Watts et al. (2013), which uses an instrument with a 5-point Likert scale. Some researchers have suggested the use of the FINCODA competency framework to measure individual skills, for instance, Butter and van Beest (2017), which is based on multi point Likert scale. The choice of the scale to measure individual competency skills depends on the context. The INCODE barometer is considered useful for the education sector, while FINCODA is useful for industry. However, both scales need to be tested for their reliability and validity parameters in any new research, as the two frameworks are still relatively new.

2.8.5.3. Interpersonal Competency Skills

Another important competency skill that is recognised as influencing individual innovation behaviour, as an antecedent, is the interpersonal competency skill (Penttilä et al., 2011; 2012). Interpersonal competency skill is defined as the ability of a person to work as a member of a team and is viewed as an important

foundation of communication and team leadership. Extant literature indicates that communication is an important aspect of the process of collective construction of ideas (Cobo, 2013; Dzansi et al., 2019). It is also observed that communication is needed for the processing, evaluation, and creation of a basis for discussion about those collective construction ideas (Berdrow and Evers, 2010). The definition of interpersonal skills indicates that innovation competence could be influenced by such aspects as teamwork, team membership, communication, leadership, and the collective construction of ideas. It is important to note that the elements that constitute interpersonal skills can be associated with innovation and innovation behaviour. Patterson et al., (2009) present the argument that communication is an important part of innovation, especially with regard to the implementation of innovation. However, the literature suggests that knowledge about the extent to which the interpersonal skills affect innovation competency is not complete, and results produced so far are inconsistent (Yesil and Sozbilir, 2013). Furthermore, with regard to the classroom setting, interpersonal skills could mean many things. One such example would be teamwork within the classroom, where group discussions could be organised by the professors on certain topics. Such group discussions could lead to the development of novel ideas within the group, which is a manifestation of the innovation competency of the students as part of the team. Novel ideas like creating and narrating a story using teamwork employing such tools as iMovie, iPhoto or digital storyboard could imply development of innovation competency in students (Stevenson et al., 2015). However, the position of whether interpersonal skills can play a role in a student's ability to develop those ideas is not well addressed in current literature. For instance, Ferreras-Garcia et al. (2021) observe that previous studies which have analysed students' perception of innovation competence achievement, which includes interpersonal skills, are scant, with a paucity of empirical evidence available for comparison. It is further suggested that such competencies should be at the forefront of pedagogy in higher education institutions (Ferreras-Garcia et al., 2021) due to the importance of innovation to all sectors of the economy. This points towards a gap in the current body of knowledge.

In furtherance of the review of the concept of interpersonal skills, as a component of innovation competency, it was deemed necessary to examine whether interpersonal skill contributes to individual innovation behaviour in a classroom setting. In fact, one of the research efforts conducted in the context of school principals in Indonesia shows that interpersonal skill, alongside innovation behaviour, could affect the performance of school principals (Siregar et al., 2020). In their research, Siregar et al. (2020) argued that innovation behaviour and interpersonal skills of principals affect their managerial competence as well as their performance. This implies that innovation behaviour and interpersonal skills, as independent variables, are associated with, and influence, the principals' performance. Similarly, Rahman et al. (2022) argued that interpersonal skills, as an independent variable, affected innovation behaviour in the context of

students in public higher learning in the southern region of Malaysia. It is argued that, with a high level of interpersonal skills, students in HEI contexts could offer new perspectives on novel thoughts and views, which can be used to increase the potential for innovation. However, it is not clear whether this could happen under ordinary classroom conditions or in very specific settings (Rahman et al., 2022).

Based on the preceding discussions, it is evident that interpersonal skills could act as an antecedent for the individual innovation behaviour of students in a higher education institution, although it is not clear whether it could occur in a classroom setting. Waseem et al. (2018), through their qualitative study, found that interpersonal skills influence value co-creation. Similarly, Hsieh and Chang (2016) posited that interpersonal skills can facilitate co-creation engagement. However, empirical studies that have established a relationship between interpersonal skills and value co-creation are scant, which indicates a gap. Waseem et al. (2018) call for more research into the potential impact of actor competence on value co-creation which includes interpersonal skills.

The literature covering the conceptualisation of interpersonal skills points to the construct being deployed as an independent variable by researchers. Siregar et al. (2020) and Rahman et al. (2022) have treated interpersonal skills as independent variables. In a similar vein, Wang et al. (2020) conceived of interpersonal skill as a mediator in their study of intercultural competencies and job satisfaction of expatriates. However, Khodijah et al. (2018) have investigated interpersonal communication (interpersonal skill) as a dependent variable in their research on "*Strategy for increasing the students' interpersonal communication skills through problem-based learning.*" Alternatively, Rhee et al. (2020) argue that interpersonal skills mediate between organisational high performance work practices and organisational innovativeness. These conceptualisations suggest that interpersonal skills can be argued to perform multiple functions, hence, operationalisation of interpersonal skills could be a challenge. In fact, in a classroom setting, it is possible that interpersonal skills could contribute to innovation behaviour directly, or those skills may have to be stimulated through an interaction between the professor and the student. This challenge is worth investigating as the outcomes of the various operationalisations of interpersonal skills could yield different results, or possibly a common result.

Theoretical support for the conceptualisation of interpersonal competency skills is provided by S-D logic theory, where value co-creation is concerned, whereas the interpersonal competency skills could be explained using the INCODE barometer (Butter and van Beest, 2017). Similarly, the relationship to individual innovation behaviour could be explained using the innovation competence model (Penttilä et al., 2011; 2012). Additionally, the relationship between interpersonal competency skill and individual

innovation behaviour requires the application of three theories, namely, S-D logic theory, the innovation competency model, and the INCODE barometer. It is not easy to ascertain whether there could be conflict between the three theories necessitating further enquiries into this subject. With regard to the measurement of interpersonal competency skill, researchers have used different scales including the INCODE barometer, FINCODA, or the Innovation Skills Measurement Tool developed by Chell and Athayde (2009). Use of the appropriate scale is vital for any measurement. The right choice of scale is important to measure a construct and its relationship with another construct. Finally, it is evidenced in the literature that researchers have used both qualitative (Waseem et al., 2018) and quantitative (Chow et al., 2013; Siregar et al., 2020) methods to investigate the concept of interpersonal competency skills. However, there is a paucity of mixed method studies in the literature, although exceptions do exist, such as the study conducted by Butter and van Beest (2017). Given that interpersonal competency skills could involve relationship aspects within groups (Marín-García et al., 2016), it is incumbent on the researcher to consider how those relational aspects can be captured through a mixed method study.

2.8.5.4. Networking Competency Skills

Amongst the innovation competency skills, the networking competency skills are considered an important component. Networking competency is defined as the capability of a person to work with people from different territories, cultures, and backgrounds in cooperative manner, leading up to the creation of a network of acquaintances (Mulder et al., 2007; Hamzah and Abdullah, 2009; Waychal et al., 2011). Moreover, with regard to organisation networking competency, it is understood as the ability to utilise existing relationships and create new ones, to help the organisation to gain competitive advantage (Mu et al., 2017). Both definitions could be applied to the classroom context where networking occurs amongst students, students–faculty, amongst faculty, extending to faculty-industry, and students-industry. It is only recently that universities have started tapping into the networking competency phenomenon by creating opportunities for students in terms of interaction with alumni, industry leaders, and firms. Particular emphasis should be on faculty to interact with industry when students are on internship or undertaking projects that concern industry. These opportunities have the potential for students to gain new contacts and knowledge on salient topics and new trends. Throughout classroom group projects, interaction with peers and learning by community of practice encourages students and faculty to generate new ideas that can lead to innovation. For instance, every university encourages group research where students are typically encouraged to participate in research work to produce new and creative ideas. Networking competence is important for students and faculty alike, without which neither could make create new contacts or maintain existing ones.

Networking competency is known to create value (Ratajczak-Mrozek et al., 2021). One such example of value created through networking is travel services offered on the internet. Through such service, an airline, travel agency, hotel or concert hall could bring together its effort as an online service. Customers can use this online service to find real-time information about various things, such as the availability of tickets, availability of rooms in a hotel, to book these tickets or hotel rooms at affordable prices. The value created is the customer comfort; to be able to book a flight conveniently, choose a hotel, and derive amusement and delight which best fits the user of the service through the click of a button. Similarly, in a higher education context, brand value can be an example of the value co-created by students, before or after students have experienced educational services (Leem, 2021) which spread through the students' networks. Innovation itself is a value created by universities, as many intellectual property rights (IPR), arising out of inventions and innovations, are developed in universities, and those IPRs have commercial value. In fact, such innovations are often developed by a network of universities, and the network competence is thus clearly at play (Kaloudis et al., 2019).

As mentioned in the earlier sections, innovation competency has already been argued to have a potential relationship with individual innovation behaviour. It has been posited that two other components of innovation competency, namely individual competence skills, and interpersonal competence skills, could each have a relationship with individual innovation behaviour. In a similar fashion, it is evidenced in the literature that networking competency skills can lead to innovation behaviour. For instance, the model in figure 2.5 posits that networking is an important component of innovation (Penttilä et al., 2011; 2012). One of the terms that is useful and can indicate networking competence with regard to innovation is crowd innovation. It is one form of innovation that involves crowdsourcing, wherein the open innovation community participates in generating innovations (Kettunen, 2016). Additionally, the literature posits that inventions, as well as collaborative and networked innovations, occur across the world. However, the literature also suggests that there is a need for greater collaboration amongst HEIs to collect, assess, and improve new ideas for further development and deployment (Kettunen, 2016). Waseem et al. (2018) indicate that there is a need for detailed investigations vis-à-vis individuals, and their competencies, in the value creation process (e.g. networking competencies) in relation to a firm's operant and operand resources. Similarly, Ratajczak-Mrozek et al. (2021) called for investigations into individual competencies as required for value creation that could emerge as a result of cooperation with others. Accordingly, it would be reasonable to infer that an investigation into the relational, or networking competence, is informed. This constitutes a gap, which is even more glaring in the context of HEIs. Those institutions that have shifted to applied research and development, from the traditional lecturing and examination format, which are then integrated into the delivery of education. This requires a collaborative effort. Student involvement in

collaborative efforts becomes indispensable. Within this context, Kettunen (2016) argues that there is a need for HEIs to create new capabilities in students, to enable them to participate in collaborative development work, for instance, innovation development processes after graduation. An important requirement for achieving this is the need for students to gain transferrable skills, such as leadership, teamwork, communication, and networking skills. However, this is a challenge (Volles et al., 2020). Networking competence could enable such students to develop and hone those skills.

One important dimension of the networking competency is the ability to co-create within a dyadic relationship. By involving students in cross-institutional research, it is possible to develop students' networking competence which could lead to value co-creation through co-innovation. Extant literature supports the argument that co-creation is part of co-innovation (Lee et al., 2012). Co-innovation is purportedly linked to networking competence directly (Kettunen, 2016). However, developing networking competence in students can be a challenge (Dobson and Edersheim, 2021). This implies that co-creating value using networking competence is challenging. The concept of co-innovation is not well established in the literature covering HEIs (Volles and Switzer, 2020). These arguments clearly indicate that there is a lack of understanding on the part of HEIs, particularly in relation to training students in gaining knowledge on networking competency through transferrable skills to enable them to co-innovate and co-create value. This is a gap in the literature.

Previous studies indicate that S-D logic can be applied to explain the concept of networking competency. S-D logic provides explanatory power useful towards understanding the co-creation ability of participants in the co-creation process (Mele et al., 2011). Additionally, networking competency could be explained by the INCODE barometer (Butter and van Beest, 2017). Furthermore, the relationship between networking competency and innovation behaviour could be explained by the innovation competency model (Penttilä et al., 2011; 2012). These theories provide the basis to explain the operationalisation of networking competency as a component of the concept of innovation competency, and the relationship between innovation competency and innovation behaviour. Combining three important theories to explain the functioning of the concept of networking competency is a complex issue.

The conceptualisation of networking competency is varied in the literature. Many research outcomes have assumed that networking competency is an independent variable that determines various aspects like the performance of an organisation (Broad et al., 2008; Raza et al., 2017). Other researchers, such as Herrala et al. (2016), have argued that networking competency should be treated as a mediating variable. Examples of networking competency as a moderating, or dependent variable, appear to be absent in extant literature.

With regard to the conceptualisation and measurement of networking competency, it appears to be widely conceived of as an independent variable. This is evident in the conceptualisation of Marín-García et al. (2013). The measurement, on the other hand, is broadly based on the INCODE barometer. Although there could be other measurements like FINCODA, it is indicated that the INCODE measurement is generally considered to be the most suitable for measuring networking competency. Furthermore, researchers are seen to have used both quantitative (Broad et al., 2008; Raza et al., 2017) and qualitative (Hammouch et al., 2021; Kruger and Steyn, 2021) research methods to study the concept of networking competency. However, mixed method studies are scant in the literature. The apparent lack of adequate studies to have dealt with the concept of innovation competency, hence networking competency, using mixed methods constitutes a gap in the literature. In summary, it is evidenced that conceptualisation of networking competency is not consistent in the literature, and the state of current knowledge of networking competency, as a component of innovation competency, is in its infancy. There is a need to undertake more in-depth enquiries to gain a comprehensive and holistic understanding of networking competency and its relationship to value co-creation.

2.9. Research Gaps

The core issue of this research is the investigation of the concept of value co-creation and its occurrence in a classroom setting in HEIs - throughout and across the process of teaching and learning. The literature shows that HEIs are places where value co-creation naturally occurs (Dusi and Huisman, 2020; Zarandi, 2022), although researchers claim that there is a paucity of studies that have clearly demonstrated the occurrence of such value co-creation. A number of co-created values were initially studied for their generation in the classroom setting, but an area that has widely attracted the attention of researchers and practitioners is that of the innovation behaviour of students. How innovation occurs inside a classroom during teaching and learning, what factors contribute to building innovation behaviour in students, and how innovation occurs as a co-created outcome, are some of the questions that were not addressed in the literature. In fact, value co-creation, as a concept, is still new to HEIs (Bovill and Woolmer, 2019), and extant literature suggests that there is a need for extensive research on HEIs to elucidate new knowledge that could be applied by those institutions (Dusi and Huisman, 2020). The review identified a variety of factors that could contribute to value co-creation in a classroom setting. However, an important area that has been considered critical for students is their experience as innovators, which is expected to help them access jobs or set up their own enterprises.

Innovation, or innovation behaviour, is a concept that is under-studied in the field of value co-creation (Nguyen et al., 2021). Furthermore, many researchers have argued that innovation behaviour needs to be

investigated in order to ascertain and understand how it can be co-produced. Further research is needed to shed light on the co-production of innovation behaviour alongside the typically expected outcomes in a classroom setting in the context of HEIs. The value co-creation literature clearly indicates that any co-produced value needs to have utility for the beneficiaries. Hence, there is a need to understand whether innovation behaviour truly benefits students. This is another gap that was identified in the literature. While it was anticipated that innovation, inside the classroom, could be co-produced, nevertheless, the literature is generally found to be silent as to how such innovation could be consumed by students for their benefit. The consumption of innovation behaviour leads to the study of value-in-use a concept which signifies value co-creation. How value-in-use can benefit students when innovation occurs inside the classroom is yet another question that is unanswered in the literature (Nguyen et al., 2021).

In summary, the following questions are still unclear in the literature:

1. How does co-production benefit students when innovation occurs inside the classroom?
2. How can innovation behaviour be developed in students in a classroom setting?
3. How does value-in-use manifest during the process of co-production?
4. How does value-in-use benefit students exactly?
5. How is innovation behaviour of benefit to students?

These gaps need to be addressed in order to reach a holistic comprehension of the concept of value co-creation and its operationalisation in a classroom setting.

This review has probed the utility of innovation competency as an intervention in the process of value co-creation. The literature suggests that building innovation behaviour in students cannot happen unless innovation competency is developed and instilled in those students. How, when, and to what extent innovation competency intervenes in the value co-creation process is not addressed in the literature. This necessitates the study of the three most critical constituents of innovation competency. An investigation of personal, interpersonal, and networking competency skill becomes imperative, as extant literature does not clearly explain how, and to what extent, those components of innovation competency affect individual innovation behaviour inside the classroom. The above-mentioned gaps clearly point out the lack of knowledge on the part of HEIs as to how they can effectively control and optimise the value co-creation process towards the benefit of students. In order to address these gaps a theoretical framework has been drawn and discussed in the next chapter.

2.10. Chapter Conclusion

This chapter demonstrated several gaps that exist in the literature. There is a clear need to investigate the concept of value co-creation in a classroom setting. This critical review of the literature indicated that co-production, as a concept of value co-creation, needs to be thoroughly understood to elicit how to appropriately deploy and maneuver it, to derive student benefits. The other co-creation constituent components, such as value-in-use, individual innovation behaviour, student benefits, and innovation competency, are also found to be lacking in depth studies with regard to the value co-creation process. Finally, there is nothing in the literature on any composite model that could provide knowledge as to how the various factors operate and affect student benefits through innovation behaviour. These aspects are discussed in detail in the following chapter through a theoretical model that has been developed for the purposes of this research study.

Chapter 3 - Theoretical Framework

3.1. Chapter Introduction

The concept of value co-creation is still considered a recent innovation, especially when applied to the higher education sector (Díaz-Méndez and Gummesson, 2012; Elsharnouby, 2015). Accordingly, it is reasonable to infer that knowledge on how, and to what extent, value co-creation can occur in HEIs is an area that might not have been comprehensively addressed or answered yet. The lack of knowledge about value co-creation can be a disadvantage to HEIs, as well as the other stakeholders, particularly the students. The result is that a phenomenon that can provide benefits to students, as well as the institutions they belong to, will be out of reach for those involved in value co-creation in HEIs. The problem of the limited knowledge about value co-creation in universities is further complicated by the lack of research publications that could guide universities and their students to exploit the benefits of value co-creation. Hence, further investigations are required to address the gap in the literature. This research aims to address this gap by investigating the co-production of innovation behaviour of students. The study investigates whether value co-creation could occur in a classroom, and if so, how and to what extent the innovation behaviour of students could be (co)produced in a classroom. The final aim is to see whether such value created in the classroom benefits the students or not. This theoretical framework provides the basis for the identification of factors that are responsible for the co-creation of individual innovation behaviour and the student benefits derived thereof, and how those factors are related. This theoretical model is expected to provide knowledge on how to control the innovation behaviour of students, and the student benefits derived thereof. The chapter discusses the various theories that support the different postulations posited in the proposed theoretical framework.

3.2. The Concept of Value Co-creation in Universities

There is evidence in extant literature to show that value is co-created at universities in different ways (Nguyen et al., 2021; Leem, 2021; Elnaggar and Hassan, 2023). Examples of values co-created at universities include functional value, social value, emotional value, epistemic value, conditional value (da Costa, 2009; Brambilla, 2016; Zarandi et al., 2022), value-in-use and transactional value (nominal value) (Vargo, 2007; Vargo and Lusch, 2017). There is also evidence that value co-creation occurs in classrooms (Prahalad and Ramaswamy, 2004; Jhantasana, 2022). However, the evidence that is currently available in the literature does not provide a mechanism by which to understand how value is co-created during an interaction between the professor and student in a classroom setting in a higher education context vis-à-vis student benefit (Leem, 2021). In addition, much of the debate surrounding value co-creation in the literature has centred on two factors, namely, co-production, and value-in-use (Dollinger et al., 2018). Factors such

as innovation behaviour, as a possible outcome of value co-creation in a classroom setting, have not been well addressed in previous studies. However, there is a strong emphasis in the literature on the need for students to be innovative in order to meet the challenges of the 21st century (Binkley et al., 2012). Experts have called for pedagogies that can help students to co-create new knowledge and develop more generic key competencies for use in the modern world (Binkley et al., 2012). Furthermore, there are calls for addressing the gap that exists between knowledge, work, and problem-solving, found in students that are not adequately supported during their study at HEIs (Bereiter, 2005; Muukkonen et al., 2010; Lehtinen et al., 2014). Accordingly, a deeper study of the concept of value co-creation in the higher education context could reveal new knowledge on how to enable universities to help students co-create value in the classroom. Although the literature indicates that much of the research on value co-creation has dealt with either co-production, or value-in-use, in a single model (Dollinger et al., 2018), this research combines both these concepts in one study. This marks a deviation that contrasts to all currently available research models.

This research draws inspiration from the seminal work of researchers including Ostrom (1996) as related to co-production, Vargo and Lusch (2016) related to value-in-use, Amabile (1996) related to creativity and innovation behaviour, Marín-García et al. (2013) related to the competence model, and Dollinger et al. (2019) related to benefits accruing from value co-creation in an educational context. The proposed theoretical framework relies on the research work of Leem (2021) and Marín-García et al. (2013).

The following sections are constructed keeping in focus the investigation on student benefits that accrue out of the value co-creation process which occurs in a classroom setting in a higher education institution context. The previous chapter demonstrated the gaps relating to student benefits in the co-creation literature (Zarandi et al., 2022). Concomitantly, this research asseverates that the influence of co-production and value-in-use on student benefits is an important, yet under-investigated, area in the value co-creation literature. Additionally, it is argued that student benefits accruing from value co-creation need to be examined, taking into account specific examples of value co-created. In line with this, it follows that one value that is co-created in the classroom would be the individual innovation behaviour of students. This is taken as an example to elucidate how value co-created can lead to student benefits. This argument is supported by Osorno-Hinojosa et al. (2022). One important caveat here appertains to whether the value co-creation process throughout the teaching and learning will benefit students. Without ascertaining this beyond simple presuppositions, it would be difficult to know how value co-created will be useful to the beneficiary, or the student, who is the unit of analysis in this research.

3.3. Relationship between Co-production and Student Benefits

In a normal classroom setting, where teaching-learning takes place, the typical activities involve creating learning objectives, developing curricula and instructional strategies, delivering instruction, embedding ongoing assessment, providing appropriate interventions, and evaluating the attainment of intended learning outcomes (World Economic Forum, 2015). Throughout this process, the benefits or outcomes that a student would expect typically include quality interactions, greater satisfaction, and advanced graduate capabilities (Dollinger et al., 2018). One important feature of the classroom interaction between students and instructors is that certain value is co-produced by the instructor-student dyad apart from the outcomes mentioned above. However, researchers have argued that it is not clear how co-creation can be understood to occur in a classroom, given a certain lack of clarity in understanding many aspects appertaining to teaching and learning (Brambilla, 2016; Nguyen et al., 2021). This is well articulated by Abrantes et al. (2007, p. 960) who indicate a gap in the educational sector when they state that "*because of innumerable measurement difficulties, the literature includes no consensus regarding key influences of teaching effectiveness and students' learning.*" Even if one were to concede that value co-creation occurs in a classroom, research outcomes that have investigated whether co-creation of value is co-produced, and whether there are benefits that can be reaped by the students and institutions, are very scarce in the literature (Chesbrough et al., 2018; Leem, 2021).

While seeking to investigate the phenomenon of co-production in the classroom, and the benefits that could accrue to the main unit of investigation (i.e. student), this research relies upon the arguments of Ostrom (1996), Vargo and Lusch (2016) and Leem (2021) to examine the relationship between co-production and student benefits. Co-production theory, posited by Ostrom (1996; p.1083), states that it is a "*process through which inputs used to provide a good or service are contributed by individuals who are not in the same organization.*" If one applies this theory, then co-production can be said to occur in a classroom where the inputs required for offering the education services by a university are provided by both the instructor and student. For instance, knowledge sharing occurs in the classroom, wherein both the instructor and students are expected to provide inputs that contribute to that knowledge sharing. One example of knowledge sharing is the exchange of experiences between a professor and the students, which can lead to co-production of value in the classroom which could contribute to co-innovation (Ingram et al., 2016). Utilising another theoretical lens, S-D logic theory posits that customers' "*participation in the development of the core offering itself*" (Lusch and Vargo, 2006, p.284) forms the co-production of value, it is possible to argue that students participate in the core offering of the education services. This lends credence to the argument that students can be considered as consumers: A position is supported by many researchers (Dean et al., 2016; Elliott et al., 2021).

Furthermore, the literature provides evidence that benefits that accrue from co-production could include improvement in quality of performance of an organisation, improved effectiveness of performance, cost-effectiveness, user satisfaction, learning new things, developing trust, citizen empowerment (Vanleene et al., 2015), and personal incentives like student outcomes (Alford, 2002; Eijk and Steen, 2016; Garcia et al., 2018). Benefits can be considered as value that is generated out of the co-creation process which involves students as one of the main actors in the classroom; an argument supported by Fan and Luo (2020). Moreover, the main point investigated is whether co-production occurs inside a classroom, and if so, whether co-production generates value that can be considered as student benefits. It is implied that much of the consumption, or use of value, will occur at some point in time. The manifestation of student benefits is supported by the experience economy theory (Etgar, 2008; Yi and Gong, 2013; Dziewanowska et al., 2016; Prebensen et al., 2016; Ranjann and Read, 2016; Dziewanowska, 2018; Leem, 2021). This theory posits that activities carried out in public sectors, which concentrate on fulfilling peoples' need for experiences, and concerns with how users, or receivers, of a good or service react to, and use, experiential components (Sundbo and Sørensen, 2013). The application of this theory offers explanatory power to better understand how students can gain experience in the classroom, for instance, experience related to innovation, if they co-produce, thus fulfilling their needs for gaining experiences through classroom interaction. Innovation is argued as being co-produced by students in the classroom through their interaction with the professor as part of the value co-creation process (Morgan et al., 2009; Leem, 2021).

In practical terms, if one considers the example of online education, students are argued to be benefitted when the number of revisits to, and time spent on, the online platform increases which is a result of value co-creation (Leem, 2021). Similarly, value co-creation is explained as influencing customer satisfaction (Ranjan and Read, 2016). Jin and Chen (2021) found that there is a relationship between value co-creation and user satisfaction. Dollinger et al. (2018) argued that the formative-indicator measurement of value co-creation can be used in a higher education context and could be linked to student benefits. At this point it is pertinent to recognise that co-creation is usually associated with co-production, an argument supported by theory of co-production based on S-D logic presented by Lusch and Vargo (2006). The need to introduce co-production as a concept is necessitated by the fact that co-production is an activity that takes place within the production process that could possibly occur even prior to the use, or consumption of, a service (Leem, 2021). This can affect customer satisfaction and loyalty (Auh et al., 2007). As for the classroom setting, the literature indicates that knowledge sharing occurs during the production process, and that such knowledge sharing by faculty members has a positive effect on student satisfaction (Rafique and Mahmood, 2018). This implies the occurrence of co-production as a process.

The preceding discussions lead to the inference that co-production, as a component of the concept of value co-creation, has a direct effect on student benefits in a classroom setting. Rubalcaba (2022) argues that education is a service that results from the co-production that occurs between two or more agents. The theoretical relationship between co-production and student benefits is further supported by Leem (2021) and Jhantasana (2023). Thus, co-production determines student benefits. The corresponding hypothesis that can be posited is:

> **H1:** Co-production has a positive effect on student benefits.

3.4. Relationship between Co-production and Value-in-use

Co-production in the classroom is understood to produce co-created value. Co-created value is argued to be a dual construct comprising co-production and value-in-use (Dollinger et al., 2018). Dollinger et al. (2018) espoused certain views about co-production that are contradicted by Vargo and Akaka (2009). Vargo and Akaka (2009) posit that while the role of customers in value co-creation is clear, their role in co-production, however, is considered optional. This contradiction implies that co-production, involving students, may or may not happen in the classroom. However, co-creation is expected to occur, hence, value-in-use as well. An example of co-production of value in the classroom could include students' innovation behaviours. This occurs when professors share knowledge and experience with their students. Innovation pedagogy is a strategic approach that can enable HEIs to strategise towards bolstering students' development of innovation competences (Keinänen and Kairisto-Mertanen, 2019). This example illustrates that learning environments can influence students to develop innovation competencies (Penttilä, 2016). However, such a claim is contradicted by Ovbiagbonhia et al. (2019) who state that learning environments contribute to achievement of students' innovation competencies only to a limited extent. Furthermore, there are calls for HEIs to focus on teaching and the evaluation of innovation competence of students more explicitly and structurally (Ferreras-Garcia et al., 2021). Such a shift, or development, is yet to manifest in a meaningful way; an area not addressed in the literature. For instance, Swanger (2016) argues that many universities boast of having creative and highly educated people, yet the same institutions are not generally considered innovative themselves. This is a problem that remains unaddressed by researchers. One reason for this could be the lack of realisation of value-in-use, or a time-lag in the realisation due to the inherently processual and dynamic nature of value-in-use.

Of the many definitions of value-in-use, the definition chosen by the researcher for application in this research is "*use by the customers of their usage experience to assess the value of a service or good*" (Vargo and Lusch, 2004; Ranjan et al., 2016). This definition is found to be straightforward and apt for the chosen context and scope.

One of the many important activities that take place in a classroom include students acting as co-creators. Such co-creation occurs when interactions take place during the service-encounter during which students present their likes, dislikes, preferences and expectations (Yi and Gong, 2013). In such situations S-D logic predicts that co-production activities, such as the interactions that take place in a service-encounter, create value for consumers or students in this context (Leem, 2021). Furthermore, the literature indicates that co-production is directly related to personalisation (Prahalad and Ramaswamy, 2004; Etgar, 2008). Personalisation, in turn, is directly related to value-in-use (Lemke et al., 2011). Ranjan and Read (2016) include user experience of value propositions, and personalisation to user requirements, as part of value-in-use. Value propositions are invitations to take part with organisations in the creation of benefits (Vargo and Lusch, 2014). Vargo and Lusch (2014) argue that firms cannot deliver value; they can only offer value propositions. Thus, universities offer value propositions to students and not value. These arguments can be applied to a classroom setting. In more recent times, online education has increasingly become a necessity, due to the COVID-19 pandemic and its aftermath. Students partake in a collaborative learning environment which enables them to acquire and share knowledge. This participation leads to interaction between professors and students, which culminates in the student learning experience, which includes knowledge sharing amongst students, and between professors and students as well. Such activities in turn can result in personalisation by students in the way students may reflect on their own experiences and share them in class. Professors and students form a relationship by taking part in the online learning exercise in equal measure. The result is co-production of knowledge sharing, equity, and interaction. This co-production process is likely to influence students' overall experience, through value propositions termed as value-in-use.

The occurrence of co-production through value-in-use in a classroom is supported by the theory of co-production, the service-dominant logic theory, and the social-exchange theory. By applying the definition of co-production as conceived by Ostrom (1996; p.1083), one can argue that inputs are provided by students in the classroom in the form of their experiences and interactions with the professor. When experience is embedded in the learning process within the classroom, the student co-produces value in terms of the total learning experience, knowledge sharing, and new relationships. Interactions in the classroom facilitate personalisation by students. The student learning experience is itself a co-created outcome. This is

explained by social exchange theory which posits that the exchange of resources between two entities gives rise to the establishment of a high-quality relationship between those two entities. This in turn leads to the generation of beneficial and productive behaviours (Blau, 1964; Cropanzano and Mitchell, 2005).

One important aspect of co-production is the experience it creates for the consumer. Previous studies suggest that the services produced and the experience of consumption of that service are different (Pine and Gilmore, 2011). Extant literature shows that services produced are intangible and consumed at the same time as they are delivered. However, experiences are argued to be different. They can be considered memorable; therefore, enjoyed as experiences over a prolonged period of time (Leem, 2021). Leem (2021) further argues that services are co-produced and customised, while experience could be considered as a highly personalised factor. As far as the higher education sector is concerned, education service is co-produced through co-participation of faculty members and students, leading to generation of personalised value-in-use that is memorable for the students and remembered over a long period of time as experience. The production of value-in-use as part of the co-production activities is supported by S-D logic (Leem, 2021). Examples of experiences of students (value-in-use) as co-creators of value during their classroom interactions (service encounters) include the expression of the likes, dislikes, preferences, and expectations (Yi and Gong, 2013). Furthermore, Etgar (2008) explains that co-production is directly related to personalisation. Thus, during classroom interaction, an environment is created to enable collaboration between the professors and students through which such students can acquire and share knowledge. This, in turn, creates learning experiences for the students (value-in-use). Knowledge sharing takes place between the students as well as between the professor and students, leading to personalisation (value-in-use) that meets the needs of the students. This experience of students, a student benefit, is influenced by co-production of knowledge sharing, equity, and interaction amongst the students and between the students and professors. Thus, a relationship between co-production and value-in-use can be said to exist.

Furthermore, Leem (2021) found a positive relationship between co-production and value-in-use. Lusch and Vargo (2006) suggest that value-in-use occurs when value is co-created. They explain that service components are transformed during service delivery as (co)production takes place. In a similar vein, Rubalcaba (2022) argues that co-production could include education services, which result from the co-production that occurs between two or more agents, for instance teachers and students. Based on the preceding arguments, it is possible to establish a theoretical relationship between co-production and value-in-use. Hence, it is possible to posit that:

H2: Co-production has a positive effect on value-in-use.

3.5. Relationship between Value-in-use and Student Benefits

Leem (2021) argues that co-participation of professors and students, which is an example of co-production of educational services, can result in value creation termed as personalised value-in-use. Such value, when co-produced with students' active involvement, is expected to be retained in the minds of students overtime in the form of experiences gained at university. As such, student experience can be construed as the net benefit a student gains at university. This suggests that value-in-use influences student benefits. Moreover, S-D logic posits that value propositions, offered by universities, produce value-in-use, hence student benefits (Vargo and Lusch, 2014). The relationship between professors and students, and the personalisation by students, affect student benefits. Student benefits could be measured by such factors as student satisfaction and student loyalty. Previous studies indicate that personalisation of services offered by organisations affects customer satisfaction and loyalty (Trivedi and Trivedi, 2018). This would be expected to hold true in the context of HEIs with regard to student satisfaction and loyalty. Furthermore, the experience-economy theory suggests that value-in-use can be explained by service experience, which includes economic value, social value, learning value, or physical value (Prebensen et al., 2016).

The literature provides evidence to suggest that relationships between professors and students have the potential to improve the performance of a university in general and enhance student satisfaction and loyalty in specific (i.e. student benefits). This is explained by social capital theory, which states that a relationship can be created through material and symbolic exchange (Bourdieu, 1986). By applying social capital theory, it is possible to explain the relationships that are created between the university and students. Badawi and Dragoicea (2023) explain that social capital has a role as a resource vis-à-vis value co-creation processes in collaborative environments for TVETs.

The explanations provided above present an argument for value-in-use as being co-produced in the classroom. Student benefits are expected to be derived by such co-production. The theory of co-production provides a basis to explain this phenomenon, as explained in the previous sections. It is important to note that not many investigations can be found in the literature to have explored, or explained, the relationship between this experience and other aspects such as customer satisfaction, or loyalty, using the experience-economy theory. One exception is the article produced by Pine and Gilmore (2011) (Mehmetoglu and Engen, 2011; Choi et al., 2013; Prebensen et al., 2016). Thus, more studies are needed to understand, and

explain, the relationship between value-in-use and student benefits, using the experience-economy theory in a classroom setting, where co-creation occurs. This represents a gap in the literature.

Service is regarded as a process at the provider's end that uses the resources for the benefit of the consumer (Vargo and Lusch, 2004; 2008). The literature shows that customers integrate resources to achieve the benefits they want, which indicates that service is distinct from value-in-use (Macdonald et al., 2011). However, the literature also shows that service is considered as a contributor to those benefits (Macdonald et al., 2011). In other words, customers feel that there is a cause-and-effect relationship between the service provision and the benefits acquired. Furthermore, Rugg et al. (2002), and Guenzi and Troilo (2006), argue that customers have several levels of knowledge across a range of goals that they want to achieve as part of the value hierarchy, including: beliefs about the service provider's attributes and features, subjective benefits, and consistencies with individualised values. Customers are likely to move back and forth between these hierarchical values and relate them to a mental map, thus making assumptions concerning the causal links between those goals (Macdonald et al., 2011). Consequently, it can be inferred that there exists a causal relationship between value-in-use and benefits as derived from the services offered by the providers.

When considering conceptualisation, the literature evidences several instances in which researchers have established a direct link between value-in-use and student benefits. For instance, Leem (2021) established a direct link between value-in-use and student benefit in his empirical study. In a similar vein, Vargo and Lusch (2004; 2006) argue that any service provision entails application of competences. Such application includes knowledge and skills that are integrated by one entity for the benefit of another. This implies that value is derived (Vargo et al., 2008). In applying this logic in a classroom setting, it becomes clear that examples of the value derived by the students will include relationships and knowledge sharing (value-in-use), which lead to learning experiences and satisfaction (student benefits). These examples, and theories, mentioned above, provide a theoretical basis to establish a relationship between value-in-use and student benefits in a classroom setting in HEIs. Thus, the corresponding hypothesis is formulated as follows:

> **H3:** Value-in-use has a positive effect on student benefits.

3.6. Relationship between Co-production and Individual Innovation Behaviour

Based on the preceding discussions, co-production can be argued as producing both student benefits and value-in-use in a classroom setting. However, previous studies provide evidence to suggest that another component needs consideration. The association of innovation behaviour with co-production should not go

ignored. According to Clark et al. (2016), who employed co-production theory to link co-production to innovation and actionable solutions, it is possible to link co-production to the innovation behaviour of students. An example of innovation in a classroom setting is provided by Woods and Homer (2022) who cite an Arts Faculty Pre-arrival project in a higher education institution and claim that it was innovative in its method of co-designing the e-learning site. The co-design extended to induction resources for students. Co-design, as a concept, is directly related to co-production, and the two concepts are often used interchangeably (Masterson et al., 2022). Students' ability to contribute, based on their prior experience of induction and virtual learning, was used. The result was that the outcome of the project was found to be engaging and meaningful for students who would begin their studies in that higher education institution.

Collins (2019) argues that technology has enabled students to learn, connect, and view themselves in different ways. Neary et al. (2014) argues that allowing students to be producers is a pedagogical approach that leads to the engagement of students in real world activities. This gives students actual responsibilities for learning as well as research-engaged teaching and learning. Neary et al. (2014) argues further that such exposure enables students to be producers of knowledge that is worth real academic value, as opposed to passive absorbers of information. Although some form of co-production and innovation appear to take place in a classroom setting, Josè et al. (2021) argue that the innovation process at the university level needs improvement. Additional studies are deemed necessary to find new ways to improve those processes using the concept of value co-creation. The lack of innovation processes at universities could be a reason for low entrepreneurial activities in some economies. This leads to the argument that innovation behaviour, in students, needs to be encouraged to improve the innovation process at the university level. Innovation behaviour needs to be developed while the students are actors, co-producing value through motivation. Following this line of reasoning, it is possible to infer that there is a need to innovate at HEIs, through co-producing innovation or co-innovating. This is important in order to inculcate such innovation behaviour in students to optimise the value co-creation process.

In order to develop innovation behaviour, the researcher argues that there needs to be a relationship between co-production, that occurs at service utilisation points, which is classroom learning and individual innovation behaviour of students. Given such a relationship, it is possible to influence the individual innovation behaviour by controlling the co-production process. Innovation, as a concept, is considered a co-created outcome in such situations. Instructors and students are found to be indispensable to the co-creation of innovation (Haput and Antonites, 2020). As such, there is scope to establish a link from co-production to the individual innovation behaviour of students. Additionally, theoretical underpinnings can be found to support such a postulation. For instance, co-production of innovation can be explained by the

theory of co-production. The definition provided by Ostrom (1996) states that it is the "*process through which inputs used to provide a good or service are contributed by individuals who are not in the same organization.*" Accordingly, students whose innovation behaviour is under study are similarly considered individuals not belonging to any organisation, and those students provide inputs to the professors to co-produce, hence, innovate. Moreover, the manifestation of innovation, as a co-created outcome, can also be explained by S-D logic theory (Vargo et al., 2008). Finally, it is possible to apply social exchange theory to provide a basis on which to define the relationship between professors and students, where exchanges of ideas and experiences take place.

Previous studies explain how service theory posits that service users are the most important source of innovation. Change in the delivery of services, and about two thirds of the innovations generated in the process of service delivery, directly involve the users in the innovation process (Alam, 2006). Extant literature also indicates that this process of service delivery, where users are part of the innovation process, is a form of value co-creation. This is important when one deals with the capacity to change both individual services and service systems (Osborne et al., 2018). Furthermore, end-users are seen to be actively involved in the co-creation process at various stages of the production process (Prahalad and Ramaswamy, 2000; Vargo and Lusch, 2004). The literature suggests that co-production occurs when end-users are involved (Brandsen and Pestoff, 2006; Verschuere et al., 2012). Further still, the concepts of co-creation and co-production are seen to be related according to Vargo and Lusch (2004). They are used interchangeably in much of the literature (Gebauer et al., 2010). When the aforementioned arguments are applied to the classroom setting in a higher education institution context, it can be concluded that students and professors become part of an innovation process where co-production and co-creation occur.

Additionally, Gallouj and Weinstein (1997) posit that innovation in services can be viewed as any change that occurs with the potential to affect one, or more, terms of one, or more, service characteristics. Gallouj and Savona (2011) argue that such changes occur based on a number of operations including addition, subtraction, association, dissociation, or formatting. Michel et al. (2008) argue that service innovation could be considered as a change in the role played by the customer and the value creation process. Gustafsson et al. (2012) claim that innovations, most of the time, manifest as a change in the competencies of a company, the competencies of the customer, the prerequisites of the service provision, or what the customer co-creates. These arguments can be directly applied to the students and professor in a classroom setting. Moreover, Ribes-Giner et al. (2016) argue that there could be a positive influence for co-creation on the student, or customer behaviour, although such an influence has not been studied in a higher education context in-depth. Thus, it is possible to link the concept of innovation to the behaviour of the students in

the classroom. In other words, innovation behaviour can be linked to the co-creation process in the classroom setting in a higher education institution. The literature shows that there is paucity of studies to have dealt with the co-creation approach in a higher education context, especially as part of an innovative management solution. The above arguments clearly point out the need to investigate the relationship between co-production and individual innovation behaviour of students in a classroom setting (Ribes-Giner et al., 2016).

Based on the preceding discussions, it is evident that a theoretical relationship between co-production and individual innovation behaviour could be established. Similar relationships have been posited (Lusch and Vargo, 2008; Dollinger et al., 2018; Dziewanowska, 2018) between co-production and individual innovation behaviour. Hence, it is possible to formulate the following hypothesis:

> **H4:** Co-production has a positive effect on individual innovation behaviour.

3.7. Relationship between Innovation Competencies and Individual Innovation Behaviour

In this research, the construct of competency was investigated through innovation competencies. The term competency itself constitutes an integration and manifestation of many attributes including knowledge, skills, and attitudes, as seen to be required of an individual to perform a concrete and authentic task pertaining to a particular and pre-defined context (Mulder and Gulikers, 2011; Sturing et al., 2011; Mulder, 2012). Furthermore, the competencies needed to be part of an innovation process will also require a bundle of knowledge, skills, and attitudes (Zhuang et al., 1999) in addition to specific individual characteristics (Da Silva and Davis, 2011). Some authors (e.g. Bruton, 2011; Peschl et al., 2014) believe that innovation competencies can be learned and developed.

Moreover, perceived competence is a factor that affects an individual and enables him/her to develop self-esteem and self-confidence (White, 1959). It is considered to be the subjective aspect of actual competence (Hsieh and Chang, 2016). According to self-determination theory, experiences such as obtaining new skills, facing challenges, or receiving positive feedback, can strengthen the sense of competence and enhance internal motivation and perceived competence (Deci and Ryan, 1980, 2000). Additionally, the literature shows that competence can emanate from an interaction between a person and the context in which the person dwells (Fischer, 1978). This implies that when the context and activities vary, competence could change in line with the change in context and activities. A good example of perceived competence is when customers participate in co-creation activities, those customers provide ideas that satisfy the needs not met

by the existing market offerings (Bendapudi and Leone, 2003). Thus, customers who participate in co-creation activities are likely to experience a feeling of competence and self-efficacy (Hsieh and Chang, 2016).

Moreover, competence can support engagement in various activities (Deci and Ryan 1980; 2000). For instance, customers participating in brand co-creation innovation may experience the satisfaction of perceived competence. This, in turn, is likely to support customers to be part of the brand co-creation engagement, experience a feeling of vigor, dedication, and absorption towards brand co-creation. This implies that when consumers are involved in co-creation activities, it follows that they experience a sense of competence that facilitates the occurrence of co-creation. The abovementioned arguments indicate that competence, as a phenomenon, can be linked to certain co-created outcomes like innovation behaviour. This argument is supported by previous studies (Hsieh and Chang, 2016). Thus, a linkage between competence and innovation could exist, which is supported by equation 3.1, which is discussed in section 3.7.1.

Innovation competencies can be classified under individual, interpersonal, and networking dimensions (Penttilä et al., 2011; 2012). These three dimensions have been posited to drive innovation in a non-linear manner (Penttilä et al., 2011; 2012) which is evident from equation 3.1 (section 3.7.1). Previous studies suggest that critical thinking, teamwork, analytical competence, problem solving, creativity, communication & negotiation competencies, and intercultural competency form part of the main concept of innovation competency skill (McPhillips et al., 2022), as expressed through individual competency skills, interpersonal competency skills, and networking competency skills (Watts et al., 2013; 2014). As such, it is possible to link each one of the three competencies individually to innovation behaviour. In considering the classroom settings, it is possible to argue that these competencies can be developed in students. Thus, innovation competencies are related to the innovation behaviour of students. It is important to understand the influence of such innovation competencies on the individual innovation behaviour of students. Hence, the relationship between each one of the three innovation competencies and the individual innovation behaviour is discussed in the following section.

3.7.1. Relationship between the Personal Dimension and Individual Innovation Behaviour

The occurrence of value co-creation in a classroom setting, in a higher education institution context, is the phenomenon that is under investigation in this research. The student is at the centre of the study. The literature indicates that students play an important role in value co-creation (Dollinger and Lodge, 2020). Whenever innovation manifests inside the classroom, it follows that innovation competence and individual

innovation behaviour become relevant concepts. It is argued that individual or personal competency skills influence the (co)production of innovation behaviour in people working in organisations. Similarly, this would apply to students in HEIs. One of the important competency skills that explains exhibition or demonstration of individual innovation behaviour as a possible antecedent to individual innovation behaviour, is the individual or personal competency skill (Penttilä et al., 2011; 2012; Ovbiagbonhia et al., 2019). It is described as an individual's capacity that is related to such aspects as creativity, persistence, risk taking, and personal outlook (Marin et al., 2013).

Amongst the three competencies, individual innovation competency is considered to be synonymous with the individual characteristics of a person in terms of the knowledge possessed by that person, the skills the person has, and the attitude as well. These are all ingredients necessary for the creation of concretised and implementable novelties, which occur through a collaborative effort throughout complex innovation processes (Bruton, 2011; Peschl et al., 2014). However, individual innovation competency is not an established concept (Hero et al., 2017). There is evidence in extant literature to show that individual innovation competence could be linked to innovation (Marín-García et al., 2013). However, research efforts that have addressed the linkage between competence factors and individual innovation behaviour in a higher education context are sparse. This is evidenced in the arguments of Hero et al. (2017) who claim that higher education institutions are finding difficulty in promoting the concept of learning for innovation. Hence, there is a need to understand how individual innovation competency could be related to individual student innovation behaviour.

Although the literature recognises the relationship between individual or personal innovation competency skills, however, there is a paucity of studies that have investigated the innovative capacity of individuals, or the methods to evaluate it and further develop it (Cerinsek and Dolinsek, 2009; Marín-García et al., 2013). Previous studies suggest that students in the modern-day educational setting in HEIs are often characterised by innovative project settings that are linked to different stakeholders, industry, or other work organisations. The relationships within the network, or industry, or other work organisations, have authentic, creative, social, and collaborative settings. While associated with those settings, students learn to transform novel ideas into practicable solutions that could be used to solve real-life problems (Rautkorpi and Hero, 2017). The literature also shows that the aforementioned authentic processes are commonly organised around inter-disciplinary teamwork, either organically or deliberately and systematically, enabling students to develop their innovation competency skills (Farrell, 2001; Edmondson, 2013). Additionally, in today's educational settings, students are generally expected to produce multiple creative solutions to open-ended tasks at some point during their course of study. This in turn is expected to develop

the students' competence and innovativeness especially in dynamic situations (Bencze, 2010; Cropley and Cropley, 2010; McLellan and Nicholl, 2011). Such solutions, as produced by students, are seen to be implemented in real-life by providing the students the opportunity for implementation leading to the creation of value (Lepistö and Lindfors, 2015).

Successful examples of commercialised student innovations include:
- The Natural Sciences and Engineering Research Council of Canada (NSERC) support for university students in promoting discovery research. NSERC fosters innovation by inviting and connecting Canadian companies to take part and invest in research projects at the postsecondary level (Valtakari et al., 2018).
- The Spark Finland project involved teams consisting of researchers, students, and clinicians. The pilot project launched in 2017. The main objective of the project was to grow ideas into new products, services, and businesses in the healthcare sector. It was considered a success (Järvelin and Hyvärinen, 2019).

Based on the preceding discussions, it is possible to conclude that students contribute to innovation as part of their learning in the university. This involves the application of individual or personal competency. In addition, Järvelin and Hyvärinen (2019) explain that as the world of business is continuously evolving around the twin forces of digitalisation and globalisation, especially with regard to value networks. Accordingly, there is a need for new co-creation models. This implies greater involvement of students, universities, startups, and entrepreneurs, concomitant with the dictates of the triple helix model of innovation (Pique et al., 2018). It is also possible to conclude that there is a relationship between the individual or personal innovation competency of students and the individual innovation behaviour of those students. The Innovation Competencies Development (INCODE) Barometer model supports this postulation (Penttilä and Kairisto-Mertanene, 2012). This postulation is also supported by the competence model posited by Penttilä et al. (2011; 2012) which states that:
- the product of individual, interpersonal and network competencies, that is (individual x interpersonal x networking) competencies = innovation $\rightarrow$ (3.1).

This equation illustrates that personal competency is part of the overall innovation competency framework (Watts et al., 2013; 2014). Hence, a theoretical relationship can be drawn between personal competency and individual innovation behaviour. Accordingly, a hypothesis can be formulated as follows:

H5a: Personal dimension has a positive effect on individual innovation behaviour.

3.7.2. Relationship between the Interpersonal Dimension and Individual Innovation Behaviour

As mentioned in the previous section, the innovation competency framework encompasses three constituent components including the interpersonal dimension (Watts et al., 2013; 2014), which is defined as the ability of a person to work as a member of a team. Interpersonal competency is considered an important foundation of communication and team leadership.

Value co-creation occurs when interpersonal competency influences individual innovation behaviour (Waseem et al., 2018). As such, interpersonal competency is identified as an antecedent to individual innovation behaviour (Penttilä et al., 2011; 2012). The literature suggests that communication is an important aspect of the process of collective construction of ideas and innovation (Cobo, 2013; Dzansi et al., 2019). An example of interpersonal skill at work in the classroom would include the novel ideas produced by students, like creating, and narrating a story, using teamwork that utilises such tools as iMovie, iPhoto, or digital storyboard, which develop innovation competency in students (Stevenson et al., 2015). However, the literature also indicates that knowledge about the extent to which interpersonal skills affect innovation competency is not complete, and results produced so far are inconsistent (Yesil and Sozbilir, 2013). Additionally, Ferreras-Garcia et al. (2021) argue that previous studies that have particularly analysed students' perception of innovation competence achievement, covering interpersonal skills, are absent. It is further suggested that such competencies should be at the forefront of pedagogy in HEIs (Ferreras-Garcia et al., 2021).

Often times, competence comes into the picture when discussing interactions that take place with other people in practice. In such situations, interpersonal skills, as manifest in sociability and collaboration, form an important dimension. This is called the interpersonal dimension (Bozic, 2017). As for the classroom context, learning can be considered a process of interaction with all situations that surround students. One activity of note that is directly involved in the interaction process of students is interpersonal communication (Khodijah, 2018). In fact, throughout the process of learning, teaching finds an important place, wherein one critical component of such teaching is considered the ability for effective communication. It is critical that there should be no mismatch between what is aimed to be conveyed, and what is actually conveyed, as this could lead to ineffective teaching outcomes (Boztepe, 2017). Furthermore, the literature indicates that interpersonal skills, amongst other competency skills, play a role

in predicting student innovative behaviour. As such, student interpersonal skills are considered among the most important factors influencing students' innovative behaviour (Rahman et al., 2022). Examples of higher education institutions supporting the development of interpersonal skills can be found with Stanford University which launched a specific, non-degree teaching centre to support students in unleashing their imagination, creativity, and innovation. In a similar vein, The Franklin W. Olin College curriculum emphasises the project-based learning approach, in addition to open-ended problem-solving and teamwork. Teamwork involves both team member and team leader roles, to be assumed by the students. Through those roles students must convincingly communicate their effort to an expert panel. This acts as a part of the gained competency by students (Hoidn and Kärkkäinen, 2014). Accordingly, it is possible to interpret the overall college experience as value co-creation. These examples support that presence of a relationship between interpersonal skills as a competency dimension and innovation behaviour.

On the one hand it is clear that interpersonal skill influences innovation competency, hence individual innovation behaviour. On the other hand, it is part of the three innovation competencies, namely individual competency, interpersonal competency, and networking competency (Penttilä et al., 2011; 2012). Consequently, it can be argued that there may be some association between interpersonal competency and the other two competencies. Thus, based on the preceding arguments, it is possible to posit that interpersonal competency influences individual innovation behaviour. This is supported by equation 3.1. Furthermore, it is also supported by the competencies suggested by Watts et al. (2013; 2014). The Innovation Competencies Development (INCODE) Barometer (Penttilä and Kairisto-Mertanene, 2012) provides a tool to measure interpersonal skill. Thus, the following hypothesis can be posited:

> **H5b:** Interpersonal dimension has a positive effect on individual innovation behaviour.

3.7.3. Relationship between the Networking Dimension and Individual Innovation Behaviour

The literature provides evidence to suggest that the networking competency affects innovation, as is the case with the other two other related dimensions, namely, individual (personal) competency, and interpersonal competency (Watts et al., 2013; 2014). Networking competency is defined as the capability of a person to work collaboratively with people from different territories, cultures, and backgrounds, leading to the creation of a network of acquaintances (Mulder et al., 2007; Hamzah and Abdullah, 2009; Waychal et al., 2011). Networking competence has also been described as the ability to utilise existing relationships to create new ones that help the organisation to gain competitive advantage (Mu et al., 2017). Universities

are increasingly trying to leverage their networking competency by creating opportunities for students vis-à-vis meaningful interaction with alumni, industry leaders, and firms. Within classroom-based group projects, interaction with peers and learning by community of practice can encourage students to generate new ideas and innovate. For instance, universities can be said to generally encourage collaborative research within the university, where students are encouraged to participate in research work together, or with an academic, to produce new and creative ideas. Networking competence is important for both students and faculty, without which they cannot make new meaningful contacts, or maintain existing contacts. Yet, extant literature indicates that the current level of investigation in the area of individuals and their competencies in the value creation process (for instance networking competencies) with respect to a firm's operant and operand resources is limited (Waseem et al., 2018). However, there is some evidence to suggest that building networking competency in students can lead to co-creation of value and co-innovation (Lee et al., 2012).

According to the innovation competency framework, developed by Charosky et al. (2022), networking is argued as being part of the innovation process. In applying S-D logic it can be argued that interactions that take place between a minimum of two entities with inherently varying roles allow for specialised competencies to be exchanged (Bruns and Jacob, 2014). This implies that a service providing organisation cannot provide value directly to the beneficiary, but can ensure that value propositions are offered, leading to value co-creation within a network (Vargo and Lusch, 2008; 2016; Blaschke et al., 2019; Hein et al., 2019). For instance, in a classroom environment, the service provided by a university, in terms of providing education, can involve the students, to learn through project-based learning in a firm outside the university premises. This creates a network of the university, students and the firm. Thus, the participation of all the parties involved in the network leads to an enhanced role of beneficiaries, which has the effect of producing beneficiary-specific results (Oesterle et al., 2020). By connecting various stakeholders, the networking competency can be honed, and conditions for value co-creation are fostered. Accordingly, the networking dimension plays a role in the process of innovation and value co-creation. This implies that a relationship between the networking competency dimension and innovation behaviour of students could exist.

Based on the preceding discussion, it can be argued that networking competency skill can influence individual innovation behaviour. This is supported by the Innovation Competencies Development (INCODE) Barometer (Penttilä and Kairisto-Mertanene, 2012) and equation 3.1. Thus, the following hypothesis can be formulated:

H5c: Networking dimension has a positive effect on individual innovation behaviour.

3.8. Relationship between the Individual Innovation Behaviour and Student Benefits

There is evidence in the literature to suggest that individual innovation behaviour can be developed in a classroom environment (Clark et al., 2016) as part of the co-creation process, using the theory of co-production (Ostrom, 1996) and S-D logic theory (Lusch and Vargo, 2008). This has been previously discussed in the earlier sections of this chapter. Some examples of innovation behaviour were cited, including co-designing and use of technology for supporting teachers. Researchers argue that innovation behaviour revolves around ideas, processes, products, and procedures, that are new, novel, and worthy of adoption in organisations (Scott and Bruce, 1994, p. 581; De Jong and Den Hartog, 2010, p. 24). Whether these ingredients could be fostered in a student (as manifestations of individual innovation behaviour), and whether this will benefit the student, as part of the value co-creation process in a university, is an important question that is still unanswered in the literature. Previous studies have suggested that, to-date, not many investigations have been conducted on the outcomes of students and higher education institutions using a value co-creation framework (Ranjan and Read, 2016; Dollinger and Lodge, 2018; Dziewanowska, 2018). The literature also indicates that value co-creation is a relatively new phenomenon to higher education institutions, and there remains a large unexplored area that is still uninvestigated vis-à-vis the relationship between value co-creation elements and student benefits or performance (Leem, 2021; Nguyen et al., 2021). However, there is some evidence to suggest that innovations produce student benefits. For instance, the literature shows that it is possible to apply the derivative concepts from the Innovation Competencies Development (INCODE) Barometer, S-D logic theory, and social-exchange theory (Lusch and Vargo, 2008; Penttilä and Kairisto-Mertanene, 2012; Wu, 2013; Dollinger et al., 2018; Dziewanowska, 2018). The INCODE barometer was previously applied by Penttilä and Kairisto-Mertanene (2012) to measure the innovation behaviour, while S-D logic can find application towards explaining the generation of co-created value as innovation behaviour. Social exchange theory can be applied to explain the way in which innovation behaviour, and student benefits, are exchanged between the university and students.

It is important to recognise that the innovative behaviour of different individuals, including students, can differ from the innovative outcomes (benefits) (Anderson et al., 2014). Examples of innovative outcomes (benefits) produced by employees in a firm include better procedures, practices, or products (Anderson et al., 2014). In fact, previous studies indicate that barely any attention has been paid to distinguish employee innovative behaviour from employee related innovative outcomes (Hughes et al., 2018). Furthermore, innovative behaviour is considered to be the complex behaviour of employees in a firm encompassing

different phases, from idea generation and promotion to idea realisation (Scott and Bruce, 1994). Accordingly, it is important to recognise that innovative behaviour and innovative outcomes are not the same, although they appear to be closely related (Li et al., 2023). Thus, it is possible to posit that innovative behaviour drives innovative outcome (benefit); an argument that is supported by Li et al. (2023). These arguments could be applied to the individual innovation behaviour of students, and the benefits students derive out of their innovation behaviour.

Based on the preceding discussion, it can be argued that there is a theoretical relationship that can be established between individual innovation behaviour and student benefits. The establishment of such a relationship is expected to clarify some of the confusion that prevails in the literature vis-à-vis a number of concepts. For instance, student satisfaction, university image, and student loyalty as constructs that have been considered to represent co-created value in the literature (Leem, 2001; Prebensen et al., 2016). However, Jhantasana (2022) posits that student loyalty is the eventual benefit a university could derive from the co-creation process. Accordingly, it is possible to establish a theoretical relationship between individual innovation behaviour and student benefits. Thus, the hypothesis that can be posited is as follows:

> **H6:** Individual innovation behaviour has a positive effect on student benefits.

3.9. Interrelationship among Hypotheses

The various hypotheses are interrelated. The common thread that ties them together is the concept of value co-creation as found to occur in a classroom setting in a higher education context. It is argued in section 3.3 that co-production is an integral component of value co-creation which can influence student benefits (H1). While it is possible to argue that co-production can directly produce benefits for students, it was not clear whether the value produced through co-production in a classroom setting truly enables the students to make use of the benefits as value, or whether co-production produces a certain value that could be used by student prior to deriving benefits. For instance, one of the benefits purported to be derived by students through co-production of value in the classroom is that of the learning experience they gain to be innovators. However, whether such an experience could be construed as a value during their studies in the higher education institution was not known. This implies that co-production of value needs to be investigated to discern and elucidate whether the value produced could be transformed into value-in-use. In other words, if students can participate in a co-production process that results in innovation behaviour, then the innovation behaviour experience they gain in the classroom could be used to implement innovations. Such an implementation gives a different experience to the students as such implementation could benefit the

community. This would enable students to derive such benefits as satisfaction. Consequently, hypotheses H1, H2 and H3 come into play together and are therefore significant to the model.

Furthermore, when innovation behaviour is at the heart of the value co-creation process in the classroom, it becomes necessary to examine the relationship between student participation in the co-production of innovation behaviour. The importance of testing this relationship lies in the fact that the innovation behaviour of students is expected to be a value created through the co-production process. Such value needs to be beneficial to the students. This cannot be simply assumed. In other words, co-production is argued as generating innovation behaviour in students, which is represented by H4. The actual benefits that students could derive out of their innovation behaviour is examined through the hypothesis H6. The triad comprising H1, H4 and H6 is integrated into the model, showing a direct path and a mediated path. Finally, it is postulated that when innovation behaviour is fostered in students, it follows that innovation competency would necessarily enter the equation and cannot go ignored. Although innovation behaviour is hypothesised as being produced through the process of co-production inside a classroom, nevertheless, it requires additional resources. Specific competencies must be present in order to support the development of individual innovation behaviour. Within this context, three competencies have been identified as influencing individual innovation behaviour, namely, the individual dimension (H5a), the interpersonal dimension (H5b), and the networking dimension (H5c). These three hypotheses are integrated into the model as independent drivers of innovation behaviour. This integration provides an opportunity to examine whether co-production alone is sufficient produce innovation behaviour, or whether innovation competencies are needed to supplement the co-production process. This integration of innovation competencies is expected to enhance the benefits derived by students through the co-production process and value co-creation process in which the core value produced is the individual innovation behaviour.

In summary, the conceived theoretical framework provides a clear basis to understand how some of the gaps in the literature could be addressed, using specific theoretical relationships. Three hypotheses have been postulated to indicate specific influence of the construct co-production on the constructs of student benefits, value-in-use, and individual innovation behaviour. Another three hypotheses have been postulated to indicate the influence of the constructs personal, interpersonal, and networking dimensions, on the construct of individual innovation behaviour. A final two hypotheses have been formulated to indicate the specific influence of the constructs value-in-use and individual innovation behaviour on the construct student benefits. The total set of eight hypotheses enabled the researcher to draw the theoretical framework diagrammatically. Figure 3.1 provides the theoretical framework developed for this research.
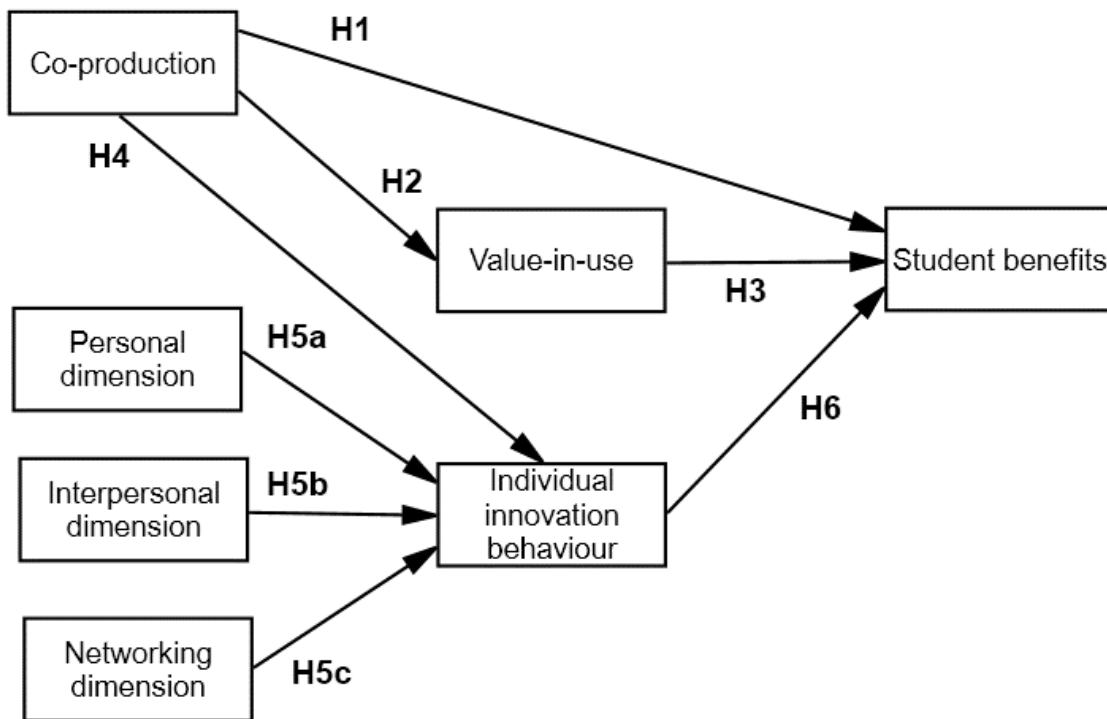
Figure 3.1: Theoretical framework of the research

3.10. Chapter Conclusion

This chapter identified various theoretical relationships that could help the researcher address the gaps found in the literature, with a particular focus on the area of value co-creation in a classroom setting within a higher education context. The central issue of this research is to identify the relationship between the two main value co-creation factors, co-production, and value-in-use, on the one hand, and student benefits on the other. Furthermore, individual innovation behaviour was identified as a construct that could mediate between co-production of value in the classroom and student benefits.

The theoretical construction of the model is characterised by the novel inclusion of personal characteristics of students which can contribute to innovation behaviour during classroom interactions. The personal characteristics included are the innovation competency constituent components, namely, personal, interpersonal, and networking dimensions of students. The model presents a theoretical basis to analyse the complex association that exists between co-production of innovation, and the role of students, through their innovation competencies, in contributing to student benefits which accrue from the interaction that leads to value co-creation.

The proffered model aims to provide a basis to analyse the importance of student innovation behaviour in the complex value co-creation process occurring in the classroom. Thus, the theoretical model is expected to provide the basis for testing the hypotheses and answering the research questions.

Chapter 4 – Research Methodology

4.1. Chapter Introduction

This chapter deals with the methodology used to answer the research questions. The chapter discusses the philosophy adopted, as well as the research design employed, in this research. The research design comprises the research framework, research strategy, data collection methods, and the method of data analysis employed. The three research questions on which this research is based were answered using the research methodology developed for this study.

4.2. Research Philosophy

Saunders et al. (2023) argue that research philosophy is a system of beliefs and assumptions. Research philosophy concerns the development of knowledge. It is common to see researchers make several tacit and overt presuppositions and assumptions during the process of research. These are commonly organised around four areas, namely, epistemology, ontology, axiology, and methodology (Creswell and Creswell, 2018). Table 4.1 provides brief details about each one of those assumptions.

	Questions	Characteristics	Implications for Practice (Examples)
Ontological	What could be the reality and its nature?	Many views could provide multiple ways to see reality.	Themes are developed through different perspectives in the findings and the researcher reports those perspectives.
Epistemological	What is knowledge? How to justify knowledge claims? What could be the relationship between the researcher and object or phenomenon being researched?	Participants provide evidence that is objective or subjective; the researcher aims to reduce the gap between the person as the researcher and the object being researched.	Evidence relied upon by the researcher is in the form of close-ended responses based on a survey, or quotes obtained from the participants; the researcher would either be objectively removed or could spend time in the field with those participants, have collaboration with them and could be seen as an "insider".
Axiological	Do values have a role in research, and, if so, what role they play?	There is an acknowledgement by the researcher that the research is value-laden and there could be biases that are present.	The discussions by the researcher are open in projecting the value that could shape the narrative and could include the researcher's own interpretations in association with those of the participants.

Methodological	What could be the process of research and the language of the research?	The logic used by the researcher could be inductive and the topic under investigation could be studied within the context. Additionally, the researcher could use the emerging design through the research process.	Particulars are important in arriving at generalisations, context is described in detail, and the questions are revised continually based on the experiences gained in the field.

Table 4.1: Philosophical assumptions (Source: Creswell and Creswell, 2018)

4.2.1. Epistemology

Clark et al. (2021) argued that epistemology deals with issues concerning that which is considered as acceptable knowledge, or what should be the acceptable knowledge in a field of research. Those authors claim that epistemology tries to answer the question of how the social world should/could be examined based on certain principles, procedures, and ethos, like the natural sciences. Saunders et al. (2023) argue that knowledge is of different types, and includes such things as narratives, stories, from facts to their interpretations, textual as well as visual data and fictional accounts. Hence, the epistemological stance adopted in research projects by researchers in business and management studies will vary. For instance, fictional literature (De Cock and Land, 2006) epistemology could vary when compared to archival research and autobiographical accounts research (Martí and Fernández, 2013). Narratives (Gabriel et al., 2013) related epistemology could be different from the two other types of research. In all those cases, the research projects will be governed by specific, but different, epistemologies. Epistemological stances that could be assumed by the researcher will fall into one of the following categories (Creswell, 2013; Saunders et al., 2023): Positivism, interpretivism, post-positivism, critical theory, feminism, critical realism, pragmatism, postmodernism, or hermeneutics. This research is concerned with positivism, interpretivism and post-positivism. These will be discussed next.

4.2.1.1. Positivism

Saunders et al. (2023) describe positivism as the philosophical stance taken by a researcher pursuing an investigation in the natural sciences. They argue that it requires working with an observable social reality to generate law-like generalisations. Positivism would lead the researcher to focus, epistemologically, on facts that are observable and measurable. Furthermore, it is presumed that the adoption of positivism as a philosophy will entail the study of observable phenomena that are measurable allowing for the possibility of generation of credible and meaningful data (Crotty, 1998). Researchers would discern whether causal relationships could exist in the collected data (Gill and Johnson, 2010). Explanation and prediction of behaviour and events in a firm are part of positivism that are supported by the abovementioned universal

laws and rules (Saunders et al., 2023). Additionally, Bryman (2012) posits the following with regard to positivism:

- Phenomena, and therefore knowledge confirmed by the senses, can truly be, and rightly considered, as knowledge (i.e. the principle of phenomenalism).
- Theory is used for the purpose of producing hypotheses, which can be tested, and enable the researcher to provide explanations about the phenomenon under study, using laws that will be tested (i.e. the principle of deductivism).
- Science must be carried out in a value free manner and hence in an objective manner.
- Between the scientific and normative statements there is a distinction and there is a belief that the scientific statements are the real domain of the scientist.
- The researcher tests theories in positivist research leading to development of laws.

However, positivism is criticised for a number of limitations which include (Braga, 2023):

- Inexplicability of social reality, considered as objective rationality by positivists, as researchers cannot delink themselves, and their beliefs and values, from the research.
- A lack of recognition of the interactions that take place between human actors, promoting the understanding of concrete happenings, leading to variations in adaptive behaviours of those human actors, and finally taking the shape of social forms.
- The assertion (of positivism) that there exists causality that can be inferred from empirical relations is unreasonable, because prediction and explanation exclude subjective interpretations.
- There can be no universal definition of truth that could be revealed, or explained, as phenomena are described by shared meanings between social actors that need to be considered, and interpreted, with regard to concrete happenings.

Within the context of value co-creation, it can be said that, from an epistemological position, researchers have used positivism in research. For example, Sadia and Akbar (2022) studied value co-creation in HEIs in Pakistan using the positivist philosophy. The study argued that there is an empirical relationship between value co-creation occurring in HEIs and sustainability. Both value co-creation and sustainability were observable quantities, where the former was measured in terms of intellectual capital, and the latter was measured in terms of practices. Theories were presented by the researchers to explain the empirical relationship existing between the two constructs. In a similar vein, Bol (2011) undertook a study to investigate the co-creation of value in real estate investments, in which he stated that most of the research efforts pertaining to the real estate field have been based on the positivist philosophy. As far as this research is concerned, there is a clear possibility that co-production, value-in-use, individual innovation behaviour,

student benefits, and the innovation competency constructs, can all be observed while those constructs are operating on the ground within a classroom environment. Hence, it appears that a positivist research paradigm could be more suitable for application. However, concepts like value co-creation and innovation occurring in a classroom have been also argued to be based on multiple forms of social behaviour; for instance, the creation of new concepts and roles of both students and instructors in the process of producing innovations in a classroom (Peschl et al., 2014). In fact, Peschl et al. (2014) argue that a constructivist approach will be more suitable to define the teaching strategy that could lead to students learning how to innovate, as a socio-epistemological process of co-creation. Therefore, there is a need to understand whether positivism alone will be sufficient to study the value co-creation process in a classroom, as faculty find a strategy for students to learn how to innovate. The appropriate choice of research paradigm is critical.

Furthermore, the literature indicates that a positivist epistemology is invariably linked to objective ontology, hence, a deductive research approach and quantitative research method (Saunders et al., 2023). The concept of ontology deals with the nature of reality (Chakravartty, 2023). The research approach deals with the rationale surrounding the choice of the approach adopted by the researcher in answering the research question (Williams, 2007). Research methods appertain to the "*how of research*" (Remenyi et al., 1998). These concepts are introduced step by step in this chapter later.

4.2.1.2. Interpretivism

According to Clark et al. (2021), the interpretive research philosophy is concerned with an empathic understanding of human action, and not with the forces that are assumed to act on it. The literature shows that the use of the interpretivist philosophy owes to its ability to enable the researcher to create a new and richer understanding of the social world, and associated contexts, as well as produce interpretations about them (Saunders et al., 2023). In research concerning management and business topics, this would mean that organisations need to be viewed from the perspectives of multiple groups of people. For instance, a researcher adopting an interpretive research stance will espouse the view that the various stakeholders in an organisation, such as a president of a particular university, a dean of a college, a professor, or student, will view and experience the organisation and its services differently. In fact, in a classroom, the question regarding how male and female students learn to innovate is a concern which is evidenced by Ferreras-Garcia et al. (2021) in their gender-based study tackling sustainable innovation in HEIs. Hence, any researcher who assumes a positivist philosophical stance would argue that the experience of all the stakeholders in a given organisation, at all times, is the same. Much of the richness experienced by the stakeholders, the difference in their experience, and the situations in which they work, would remain hidden. Additionally, organisations are conceived to be complex entities, not for the difference in employees' roles,

but because of a variety of other factors which include, gender, ethnicity, and cultural backgrounds. Hence, interpretations are needed based on an in-depth analysis of the situation under study. Concomitantly, the literature posits the following with regard to interpretivism:

- Emphasis on the importance of language, culture, and history (Crotty, 1998) that are needed to give a shape to the interpretations people make, and the experiences they have, with organisational and social worlds.
- Focus on interpretations and meaning making, complexity, and richness, of the phenomenon under study.
- Explicit subjectivity.
- Researchers' own values and beliefs being of importance to the research process, as the interpretations are based on those values and beliefs.
- Researchers' need to have an empathetic stance.
- The need for the researcher to be part of the social world of the participant; to probe the world from the participant's point of view, to gain an understanding of the world (Saunders et al., 2023).
- There is an assertion that there is a basic difference between the two aspects, namely, subject matter of the natural sciences and the social sciences. It is also implied that there is a need for an epistemology that will dwell upon that difference and capitalise on it (Clark et al., 2023).

Critiques of interpretivism, however, point to a number of limitations which include:

- Interpretivism abandons the verification aspects used in scientific method. This makes it difficult to generalise the results for application elsewhere (Mack, 2010).
- As far as ontological stance is concerned, interpretivism uses subjective assumptions, and ignores objective ones (Mack, 2010). This leads to researcher interference in the study.
- The researcher is part of the research; hence, they cannot divorce from the assumed perspective (Mack, 2010). This could introduce bias.
- Research methods attached to interpretive philosophy are not 'rigorous' nor reliable (Yanow and Schwartz, 2009).

Despite the criticisms levelled at it, the interpretive philosophy is still widely used by researchers involved in value co-creation. For instance, Royo-Vela and Serrano (2021) applied the interpretive philosophy while studying the 4.0 SMEs in relation to the value co-creation process, and the measurement of value co-creation in those SMEs. They investigated the value co-creation process in the B2B marketing innovation context using case studies. Similarly, Yeboah (2023) investigated the concept of value co-creation, in the context of the hospitality industry, and explored the perceived value as a concept that affected the successful

implementation of value co-creation at the dyadic level. Both the studies investigated the subjects and their lived experiences by deploying the qualitative method and semi-structured interview strategy. However, many researchers have suggested the use of a post-positivist research philosophy in relation to understanding the concept of value co-creation. For instance, Maxwell-Stuart et al. (2018) investigated the relationship between support, co-creation of value, and student satisfaction, in addition to the utility of moderators in a higher education context using survey strategy. The authors recommended further research to be conducted in this area using mixed method research, which is associated to the post-positivist research philosophy (Saunders et al., 2023). Additionally, the literature evidences that interpretivism is commonly associated with subjective ontology, inductive research approaches, and qualitative research methods (Mack, 2010; Creswell and Creswell, 2022).

4.2.1.3. Post-positivism

Creswell and Creswell (2022) claim that post-positivism refers to the representation of certain beliefs that come after, and supersede, positivism. This paradigm assumes ontological realism. It questions certain commonly accepted beliefs such as the absolute truth of knowledge (Phillips and Burbules, 2000). It affirms that it is not possible to be absolutely positive about claims of knowledge through studies that are concerned with behaviour and action of human beings. Historically, the emergence of post-positivism as a philosophy can be traced back to writers including Comte, Mill, Durkheim, Newton, and Locke of the 19th century (Smith, 1983), and of late to Phillips and Burbules (2000).

Some of the important characteristics of post-positivism include determination, reductionism, empirical observation, and measurement and theory verification (Creswell and Creswell, 2022). Researchers adopting a post-positivist philosophy are loosely attached to the belief of cause and effect and investigate such causality in their research. Post-positivism entails a sequence of logically related steps which involve researchers espousing multiple perspectives, as offered by participants, and not a single reality. Furthermore, researchers will normally employ rigorous methods of qualitative data collection and analysis (Creswell, 2013). Creswell argues further that several stages of data analysis will be conducted to ensure rigour, and that computer programmes may be used to support the analysis, whereby validity tests will be adopted. A scientific report on the qualitative study will be provided, having a structure similar to that of the quantitative method. The literature shows that some researchers have approached the qualitative method as part of the post-positivist philosophy (Taylor and Bogdan, 1998; Denzin and Lincoln, 2005). However, in contrast to the above arguments, Creswell and Creswell (2022) state that post-positivism supports the need for careful observation and measurement of object reality that is found to exist in the world, through which knowledge is developed. It entails the need for the researcher to develop numeric measures of

observations, while studying the subjects and their individual behaviour. In addition, Creswell and Creswell (2022) argue that laws and theories are important for applying a post-positivist philosophy, and that such theories may have to be tested, or refined, leading to an understanding of the world. In fact, Creswell and Creswell (2022) recommend that the assumptions suggested by Phillips and Burbules (2000) be used as guidelines in post-positivist research that is heavily loaded in favour of quantitative research method. More specifically, the recommendations are:

- Researchers may not prove hypotheses but find out whether there is a failure to reject hypotheses. The reason behind this is the belief that knowledge is conjectural, and it is impossible to find absolute truth. This further leads to the inference that evidence derived through research could always be imperfect and fallible.

- Some of the claims made through the process of research need to be refined, or abandoned, in favour of other claims that may be warranted. For this reason, a majority of the quantitative research efforts begin with the testing of a theory.

- It is important to use data, with evidence and considerations that are rational, to give shape to knowledge. For instance, researcher gather information or data through instruments comprising measures, and those instruments are completed by the participants, or the researcher, who use(s) the instrument to record observations.

- When studying phenomena, researchers seek to develop true statements that are relevant to the study and use those statements to explain the phenomenon or situation being observed, or any causal relationship of interest. For instance, with regard to research using the quantitative method, researchers study the relationships between variables and describe those relationships in the form of questions and/or hypotheses.

- To be objective is an important part of post-positivist inquiry. Bias needs to be removed, by testing methods and conclusions. For instance, in quantitative research methods, reliability and validity tests are considered essential.

Based on the preceding discussion, it is evident that post-positivism advocates the use of a mixed method strategy in research, which includes the use of both quantitative and qualitative research methods. It can therefore be argued that while adopting a post-positivist philosophy, a balance needs to be struck between the quantitative and qualitative research methods in such proportions that the researcher is able to answer the research questions and achieve the slated goals. This is in line with the arguments of Morgan (2022). According to Morgan (2022), researchers need to understand how the quantitative research method and post-positivist research philosophy can enhance, or weaken, qualitative research, and accordingly make decisions to achieve the goals set for a particular research project.

A post-positivist research paradigm has several advantages. Firstly, it is considered a valuable philosophy that can be used to understand the lived experience of people (Morgan, 2022). Post-positivism answers the questions of who theory is working for, which is not answered by positivism. In addition, post-positivism responds to the changing nature of phenomena (Loughlin, 2012). More importantly, post-positivism is a representation of a new line of thinking that comes after positivism (Creswell and Creswell, 2022). Concomitantly, Terry et al., (2017) state that post-positivism is designed to reduce researcher bias, thereby enhancing the reliability and objectivity of results. While such a paradigm should involve a balanced utilisation of subjective and objective ontologies, nevertheless, it should also ensure that both inductive and deductive research approaches are used as ontologies. This implies that both qualitative and quantitative research methods would be employed in the research project.

Post-positivism, however, is not free from criticism. Many researchers have attacked post-positivism. It is argued that post-positivist discourse does not provide clear criteria for choosing from the multitude of explanations it produces, which can be competing in nature (Biersteker, 1989). Additionally, there is no consensus amongst post-positivist supporters on what to accept vis-à-vis the numerous confusing explanations produced through post-positivist research. Finally, some argue that there are situations wherein the post-positivist logic could be used to criticise post-positivism as a philosophy (Loughlin, 2012).

Within the context of value co-creation, the literature provides evidence to suggest that a majority of the empirical research publications produced have used the qualitative research method. According to Saha et al. (2022), almost 60% of the research papers produced on the concept of value co-creation have employed the qualitative research method, while approximately 24% have used the quantitative research method, and the remaining 16% have used mixed method research. This demonstrates a dearth of research in the body of literature on value co-creation wherein the mixed method approach was adopted. Hence, there is a paucity of value co-creation studies employing the post-positivist research philosophy.

Following the discussion on the three main research philosophies that are widely used by researchers in the field of value co-creation, it is essential to justify the choice of the most appropriate research philosophy that is suitable for this research. This will be discussed later in the chapter, after reviewing the ontological aspects of research, the different research approaches, and the related research methods.

4.2.2. Ontology

Widely used research ontologies include the subjective ontology and objective ontology (Scotland, 2012; Saunders et al., 2023). Ontology informs the assumptions made by the researcher regarding reality (Braga,

2023). Objective ontology is concerned with precise observation and measurement, which could be verified, while subjective ontology is concerned with truth that is subject-dependent and contextual. The ontological characteristics of the objective and subjective positions taken by a researcher are comprehensively listed in table 4.2.

	Objective Ontology	Subjective Ontology
Philosophical underpinning	Positivist/ postpositivist	Constructivist/ interpretative
Nature of knowledge	Objective	Subjective; idiographic
Assumption(s)	Based on a single reality that is knowable within a probability.	Based on multiple realities that are constructed socially.
Methodology	Quantitative; correlational; quasi experimental; experimental; causal comparative; survey	Qualitative; phenomenology; ethnographic; symbolic interaction; naturalistic
Research approach	Deductive	Inductive
Is it value-free?	Yes	No. Belief of the researcher that human and social behaviour is value-laden.

Table 4.2: Comparison of subjective and objective ontology (Source: Chilisa, 2019; Creswell and Creswell, 2022)

The comparison between the two ontologies tabulated in table 4.2 provide a glimpse of the different aspects that concern the two widely used ontologies in research. The main strengths of objective ontology are that it is objective, value free, and based on single reality, leading to supposed generalisability (Chilisa and Kawulich, 2012; Chilisa, 2019; Handema et al., 2023). The limitations of objective ontology include the fact that it ignores values associated with human nature, subjective aspects such as lived experience of people and ethnicity and depends on predictions about phenomena using theories (Creswell, 2013; Terry et al., 2017). In the same vein, the subjective ontology's main strengths are seen to be its consideration of values associated with human beings, and groups of human beings, without which it is not possible to understand the underlying truth. Subjective ontology takes the view that there are multiple realities that are socially constructed. In addition, such an ontology provides knowledge about human nature and its description. The limitations of subjective ontology include the fact that its outcomes are not regarded as generalisable. Furthermore, researchers cannot avoid bias and cannot test for reliability and validity of the results of their research (Chilisa and Kawulich, 2012; Creswell, 2013; Chilisa, 2019).

Within the context of value co-creation, many of the research publications found in the literature are seen to have adopted a subjective ontology (Saha et al., 2022). An example of subjective ontology in a classroom setting could be the innovation experience gained by the students, as understood using subjective ontology (Peschl et al., 2014). However, it is important to note that there are research outcomes that have measured innovation experience using objective methods. For instance, the research conducted by Costa et al. (2021) studied the co-creation processes, involving students and partners outside as companies and public institutions, using an objective method (i.e. quantitative research method). Additionally, there are research outcomes that have used a combination of both objective and subjective ontologies. For example, Lei and Hock (2020) used a mixed method approach to study the enhancement of innovation capability using entrepreneurial education. This study used both the objective and subjective ontologies. The literature is replete with cases of mixed method research, although examples of such are more limited in the area of co-creation. Nevertheless, this demonstrates how various researchers have adopted different ontological positions to conduct research in the field of value co-creation in a classroom setting, indicating that the choice of the ontological stance is largely contingent on the research questions. Ample justification needs to be provided to select a particular ontology, or combination of ontologies The choice of the ontological stance for this research is described later in this chapter. The next section of this chapter will provide an overview of the axiological aspects of research.

4.2.3. Axiology

Hartman (1995) describes axiology as a science that has its concerns placed in the social and humanistic disciplines, akin to the role mathematics plays vis-à-vis the natural sciences. Axiology is also referred to as value theory (Hartman, 1995). Saunders et al. (2023) argue that axiology is a field of research which talks about the role that values and ethics have in a particular inquiry. This philosophy is based on the questions about how researchers manage, and handle, concepts like their own values, and those of others who ae research participants. Dudovskiy (2016) states that axiology is a philosophy that relates to the question of what a researcher values in his or her research. An example of the application of axiological considerations could be the research proposal prepared by applicants, in the pursuit of a higher degree, containing a section on ethical issues and protocols. In such cases, the candidate must normally demonstrate that protocols are in place for good practice vis-à-vis ethical conduct. This involves a demonstration of a clear understanding of what is right or wrong conduct when undertaking data collection (Kivunja and Kuyini, 2017).

Within the context of value co-creation, the literature evidences researchers' use of axiology as a possible perspective in research. For instance, Zhaoxia (2019) studied the conflict and balance of multiple value creation subjects in relation to short video platforms. However, not many research papers are found in the

literature to have used axiology as the sole perspective in their research. It appears that axiology is largely inherent in research efforts, as value is an inseparable part of research activities. As far as this research is concerned, the principles of axiology will be used in many sections. For instance, values will have definite relevance on the research proposal, research design, methods used in research, data collection process, analysis, and discussions. The topic of value co-creation in a classroom setting, generating value-in-use for students, individual innovation behaviour of students, and student benefits, is grounded in the value-system the author subscribes to. This is clearly espoused in the philosophical stance outlined in the earlier sections of this chapter.

Although there are many advantages to the application of axiology, including emphasis on ethics, values, respect for the participants, importance of morality, and the understanding of what is right or wrong behaviour as one conducts research, nevertheless, there are several criticisms levelled against it. For instance, Einstein (1950; p.15) says:

"*When the basic concepts of a theory are comparatively "close to experience" ... its speculative character is not so easily discernible. If, however, a theory is such as to require the application of complicated logical processes in order to reach conclusions from premises that can be confronted with observation, everybody becomes conscious of the speculative nature of the theory. In such a case an almost irresistible feeling of aversion arises in people ... who are unaware of the precarious nature of theoretical thinking in those fields with which they are familiar.*"

In another instance Hartman (1995; p.55) quotes an incident and states:

"*The programmer who was to program the axiological formulae of the value calculus into a computer actually got a nervous breakdown because, as she said, of the power of the calculus, and had to interrupt the work for six months for this reason.*"

However, there are contradictory opinions in the literature with some criticising axiology, while others are seen to be criticising natural science. Some have gone as far as attacking philosophy and the scientific method altogether. For instance, Hartman (1995; p.55-56) states:

"*From the point of view of philosophy, science is a methodological disease; but from the point of view of science, philosophy is a disease of obfuscation. There is no "maturity" in philosophy because philosophy is*

aporetic, and the questioner never matures; only the answerer does; and if he is an answerer, he will become a scientist, as did Galileo Galilei, Sir Isaac Newton, Rene Descartes, and G. W. Leibniz."

Based on the discussions above, and considering the focus of this research, which revolves around value co-creation in a classroom setting, there is an inherent axiological perspective already contained within this research. As such, the researcher does not adopt an explicit axiological stance in this thesis.

Table 4.3 below has been provided to illustrate the comparison between the different philosophies that have been discussed, while keeping in view the different aspects of research. Further to this the next section describes the research approach and research methods that need to be chosen for this research.

	Positivist/ Postpositivist Philosophy	Constructivist/ Interpretive Philosophy
Reason for the study	To identify laws that are generalizable and regulate the universe.	To gain an understanding of human nature and describe it.
Philosophical underpinnings	Realism along with idealism and critical realism are the philosophical underpinnings that concern researchers.	Hermeneutics alongside phenomenology inform researchers about the philosophical underpinning.
Assumptions concerning ontology	Based on a single reality that is knowable within a probability.	Based on multiple realities that are constructed socially.
Importance of the position of values in the study	It is believed that science should be value free and values have a position only when topics of research are chosen.	It is believed that values form an integral part of human life and society; no value or values of a group are wrong, could be only different.
Nature of knowledge	Objective	Subjective; idiographic
What is considered as truth?	Truth is that which is observable precisely and measurable; measurements are verifiable.	Truth is context dependent.
Methodology	Quantitative; correlational; quasi experimental; experimental; causal comparative; survey	Qualitative; phenomenology; ethnographic; symbolic interaction; naturalistic
Techniques used to collect data	Majority of the studies use questionnaires alongside observations, experiments and tests	Majority of the studies use Interviews alongside participant observation, pictures, photographs, diaries and documents

Table 4.3: Comparison of philosophies (Chilisa, 2019)

Amongst the widely used research approaches are the inductive and deductive research approaches that help the researcher in understanding the data analysis process (Creswell, 2013). Bougie and Sekaran (2019) argue that the inductive approach involves observing specific phenomena to generate conclusions that are generalisable. In other words, inductive reasoning begins with a specific aspect and moves towards reaching a more general finding. In contrast, deductive reasoning involves the testing of a theory. Researchers adopting a deductive research approach will begin from a more general field and reach a more specific related aspect. Researchers will begin with a theory and proceed towards relationship elicitation, after which specific hypotheses will be formulated and tested. This way, it will be possible to confirm the original theory (Bougie and Sekaran, 2019). With respect to inductive reasoning, it is considered as being commonly linked with the interpretive research philosophy, subjective ontology, and the qualitative research method. Deductive reasoning on the other hand is related to the positivist research philosophy, objective ontology, and the quantitative research method (Clark et al., 2021; Saunders et al., 2023).

The advantages of utilising an inductive research approach include sensing what is going on in a situation, leading to a better understanding of the problem. Whereas the advantages of using a deductive approach include the use of a highly structured methodology which should enable the researcher to replicate the research and outcomes, which in turn would ensure a degree of reliability.

Examples of the inductive approach to value co-creation in a classroom could be found in the research works of Wu et al. (2022) who investigated how big data alters value creation, through the lens of big data competency, using inductive reasoning. Similarly, more examples can be found with regard to other research efforts, including those of Lubicz-Nawrocka (2019), Mathisen and Jørgensen (2021), and Jain et al. (2022).

The inductive approach is not without criticism, however. Inductive reasoning has been criticised for its inability to formulate hypotheses for rigorous testing (Popper, 2002a; 2002b). Researchers involved in inductive research have also been criticised for exhibiting a lack of comprehensive knowledge about the relationships that could exist between variables and about data (Saghafi, 2014). Furthermore, some have argued that induction altogether, as a concept, could be falsified as it is based on human observation (Zalaghi and Khazaei, 2016). Criticisms against the deductive approach include the lack of usefulness of deductive reasoning in everyday problems as the data available is sparse, noisy, and uncertain (Chater et al., 2011).

In addition to inductive and deductive approaches, there exists another approach that relies on both inductive and deductive reasoning. This third approach is called the abductive approach. In this type of approach the researcher goes back and forth, thereby combining both inductive and deductive research approaches in the study (Suddaby, 2006). According to Saunders et al. (2023), abduction involves obtaining data that is sufficient, detailed, and rich, allowing phenomena to be explored, leading to identification, as well as explanation, of themes and patterns. The following step would be to integrate those explanations in an overall conceptual framework that leads to the development of a theory. The constructed theory would then be tested using data that is currently available and newly collected data as evidence. The final framework could then be adjusted, and revised, as per the findings (Saunders et al., 2016).

As for the research approach, Saunders et al. (2023) recommend that the choice is contingent on the emphasis of the research, and the nature of the research topic. Therefore, whether the research approach should be inductive, deductive, or abductive, should be a judgement made by the researcher, taking into account the various concerns being addressed, as well as the individual characteristics of the research approaches. The choice of the adopted research approach for this thesis is provided later in this chapter. Following the discussion of the concerns and characteristics of the three research approaches, the discussion proceeds further towards an understanding of the different research methods that are commonly used by researchers in various research efforts, in order to ensure that the most appropriate method could be chosen for this research.

4.3. Research Method

Widely used research methods include qualitative, quantitative, and mixed method research (Williams, 2007; Taherdoost, 2022). The importance of the research method lies in the following (Clark et al., 2021):

- Sensitising the researchers about the choices available in relation to research methods that can be employed to collect data, in addition to the different ways by which the data could be analysed.
- Creating awareness amongst the researchers about the choices they have to make for the research project. Choices need to be made by those researchers with regard to specific data collection techniques and analysis.
- Familiarising the researchers with the dos and don'ts of employing a particular strategy for the collection and analysis of data. This implies that the researchers will understand the practices they should adopt in order for the method to be implemented appropriately. Moreover, the researchers must have knowledge about the many pitfalls that could be encountered through the research journey, and how to deal with them.

- Gaining insights into the whole process of research towards developing a view of how research is conducted at every stage. This enables researchers to plan their research. The researchers are pushed to think about different research related aspects including how to link the research method to the research question.
- Building an awareness on how to distinguish between good and poor research on the one hand and developing a critical awareness of the limits and limitations of the research undertaken.

Essentially, research methods imply how the data is collected. According to Bryman (2012; p.46) "*A research method is simply a technique for collecting data. It can involve a specific instrument, such as a self-completion questionnaire or a structured interview schedule, or participant observation whereby the researcher listens to and watches others*".

The choice of the research method, or methods, is of vital importance to research if the research questions are to be answered appropriately. The three research methods are discussed in the subsequent sections.

4.3.1. Qualitative Research Method

Qualitative research has developed and advanced considerably since the early 2000s. Although American journals are still found to be largely quantitative leaning, European journals, by contrast, are found to be much more sympathetic to, and embracing of, qualitative studies (Bluhm, 2011). Amongst the reasons for the stigmatisation of qualitative research methods are the view that it lacks standardisation and often relies on unconventional data collection techniques. In fact, the criticism of qualitative research has gone as far as labelling it second class research and "*the unwanted, red-headed stepchild of the field of management*" (Eby et al., 2009). However, qualitative research has many strengths, and practice is constantly developing.

Clark et al. (2021) argue that the qualitative research strategy tends to largely lay emphasis on words as opposed to numbers. Although this description is terse and superficial, it is also a very common description of the difference between quantitative and qualitative, with many others having described such difference as being research with numbers versus research with no numbers. In qualitative research, data is normally collected through observation or interviews. Clark et al. (2021) explain that the qualitative tradition involves broadly inductivist, constructionist, and interpretivist research strategies, although researchers involved in qualitative study do not necessarily always subscribe to all the three features. Qualitative research addresses issues that are concerned with the practical and scientific issues of society. Empirical material used in this research method consists of case studies, life experiences, and stories. Those materials discuss the routines and problems that people face in their lives. Such aspects are normally studied in-depth to determine the

motivations that cannot be quantified and numerically assessed (Taherdoost, 2022). This allows for rich and descriptive findings that are characterised by contextual depth (Lee, 1999), owing to the nature of this method being context-dependent (Heigham and Crocker, 2009). In broad terms, qualitative research discusses two issues, "*the way to do things*" and "*the outcome of tasks*" (Aspers and Corte, 2019). Furthermore, the qualitative method is related to exploratory research that can enable the discovery of new insights, ideas, and generation of new theories. In summary, qualitative methods are linked to interpretive epistemology, subjective ontology, and inductive reasoning. There are many approaches within the qualitative tradition. These are provided in figure 4.1.
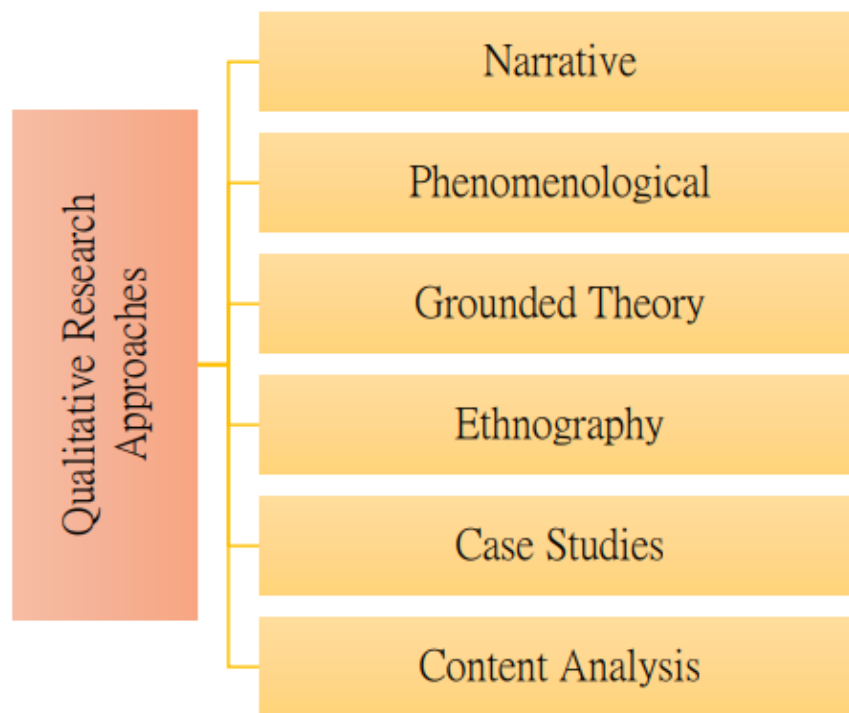
Figure 4.1: Various approaches used in qualitative research method (Source: Taherdoost, 2022)

An outline of the advantages and disadvantages of using qualitative research is provided in a tabulated form in table 4.4 next.

Advantages	Disadvantages
- In-depth information could be gathered concerning. - feelings and events. - Understand the real meanings of all actions of human beings. - Possibility to discover experiences of various individuals in multiple situations historically. - Being part of the human beings under study and interacting with them provides rich information about those human beings. - Complex issues could be addressed using flexible structures and giving freedom to the participants.	- Does not address contextual sensitivities as the focus is on experiences and meanings. - Credibility is low. - Generalisation of findings of the research not possible since sample sizes are small. - Time consuming and labourious process involved in data gathering and analysis process.

Table 4.4: Advantages and disadvantages of qualitative research method (Source: Taherdoost, 2022)

The qualitative research method appears to be the most prevalent research method used in the field of value co-creation (Saha et al., 2022). Examples of researchers who have used the qualitative research method in the field of value co-creation in an educational setting include Eijk and Steen (2016) and Bandola-Gill et al. (2022). As previously stated, the choice of qualitative methods for a research topic depends on a number of factors as outlined above. In this thesis, the exact research method will be determined based on the needs of this study which is explained later in this chapter.

4.3.2. Quantitative Research Method

The quantitative research method addresses rational questions that are developed taking into account the variables of the study. It relates to explanatory study approach which enables the researcher to elicit relationships and predictions that have potential for generalisability across contexts, including people, events, or territories (Taherdoost, 2022). This method emphasises quantification of the collected data and its analysis (Bryman, 2012). Williams (2007) suggests that numeric or statistical approaches to research design form a part of the quantitative research method. Leedy and Ormrod (2005) indicate that surveying and experimentation are important to quantitative research as it builds on currently available theories. Furthermore, assumptions and/or hypotheses are considered a vital part of quantitative research (Clark et al. 2021). Finally, the researcher is viewed as independent of the research and the meanings that are elicited

using objectivity. Important research approaches that are identified as part of the quantitative tradition are provided in figure 4.2.
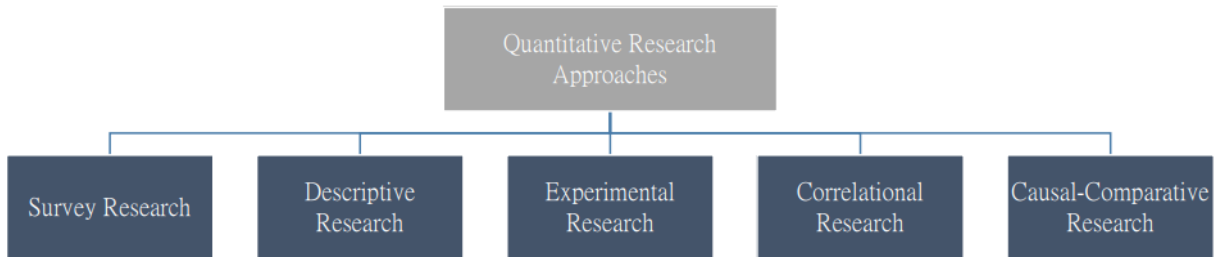
Figure 4.2: Various approaches used in quantitative research method (Source: Taherdoost, 2022)

The advantages and disadvantages of using quantitative research are tabulated in table 4.5.

Advantages	Disadvantages
- Results could be generalised to different contexts. - Sampling strategy provides representation of the target population using large sample sizes. - Useful to replicate the research process over time and in other contexts and sharing methods and frameworks with other researchers. - Methods could be standardised for adoption by other researchers. - Efficient.	- Does not address hidden reasons concerning individual's feelings and actions. - Sometimes sampling process could take longer time. - Social realities and how they are shaped are not properly described. - Subject reality like behavioral aspects are not addressed.

Table 4.5: Advantages and disadvantages of quantitative research method (Source: Taherdoost, 2022)

Within the context of value co-creation, the number of research publications that are found to use the quantitative research method are far fewer when compared to qualitative research studies (Saha et al., 2021). However, the literature does provide evidence of cases wherein researchers are found to have used the quantitative research method in the investigation of value co-creation in an educational context. For example, Leem (2021) studied student benefits as a function of co-production in a classroom. In the industry context, Li et al. (2023) used a five-point Likert scale survey method to measure employee innovation. Hence, it is evident that quantitative research methods are used in value co-creation research.

Quantitative research methods are linked to a positivistic philosophy, objective ontology, and deductive reasoning (Saunders et al., 2023). The decision to use a quantitative research method will depend on a number of factors, as previously outlined. Accordingly, any such decision or choice would need to be justified. In this thesis, the exact research method will be determined and justified based on the needs of this study. This is explained later in this chapter.

4.3.3. Comparison of Quantitative and Qualitative Research Methods

According to Creswell and Creswell (2018), both qualitative and quantitative research methods suffer from weaknesses and biases. While responses generated from quantitative data are generally found to be closed-ended (e.g. questionnaires), qualitative data is found to be open-ended, without predetermined responses. Table 4.6 provides a comparison of the two methods.

#	Qualitative Method	Quantitative Method
1.	Methods that are emerging	Pre-determined
2.	Open-ended questions	Closed-ended questions or research instrument-based questions
3.	Data collected through interviews, observations, published documents and audio-visual means	Data collected pertains to performance, attitude, observational and census
4.	Analysis is based on text and images	Analysis is based on statistics
5.	Findings pertain to themes, patterns, and interpretations	Findings based on interpretation of results obtained through statistical analysis

Table 4.6: Comparison of qualitative and quantitative research methods (Creswell and Creswell, 2022)

Table 4.6 provides a clear illustration of the common purpose for both the methods available to derive knowledge. It is evident that there are strengths and weaknesses in both the qualitative and quantitative methods. For example, with regard to the former method, it can be seen that interviews could provide rich information about the various experiences of participants in the research. However, conducting interviews can be laborious and time consuming even when this involves only a small number of participants. In the case of the matter research method, closed-ended research instruments can be distributed to a large number of participants. This provides a wealth of information that is objective. However, the data collected is based

on pre-determined responses; hence, it is not possible to collect data that adequately captures participants' feelings, thoughts, ideas, or interests. Furthermore, both methods constitute attempts to collect data regarding various attributes of the participants, either in the form of numerical data, text, or image. Accordingly, the strength of one method could be used to offset the weakness of the other. Hence, if both the methods are combined, as part of a systematic research design, the result obtained could amount to rich datasets that allow for comprehensive information that yields a deeper understanding of human behaviour and the phenomenon under study. Consequently, it is reasonable to infer that mixed method research is comparatively more beneficial that mono-method research in the explication and exploration of phenomena.

Within the context of value co-creation, there is scope to conduct research using mixed method to exploit the strengths of both methods, while compensating for the weaknesses of those methods. Examples of mixed method research designs are found in the education sector, for instance, Lan et al. (2017) who investigated value co-creation in relation to social innovation in China. Hence, the following section reviews the literature concerning the use of mixed method research.

4.3.4. Mixed Method

Clark et al. (2021) explain that the mixed method is an approach to research that combines, or integrates, both quantitative and qualitative research methods. Essential to this method is the application of the philosophy of post-positivism (Creswell and Creswell, 2018). Although there is no consensus as to which one of the two integrated research methods should normally be dominant, or whether both of them should have equal importance, nonetheless, there are many accounts in the literature to suggest that all these options are permissible. For instance, Cohen et al. (2017) argue that in the mixed method approach, researchers adopt either a convergent parallel design, explanatory sequential design, exploratory sequential design, or an embedded design. Each one of these procedures is discussed briefly below, based on Creswell and Creswell (2022; p.52).

4.3.4.1. Convergent Parallel Design

The convergent parallel design allows the researcher to converge on, or merge, both quantitative and qualitative data, which helps in a comprehensive analysis of the research problem. The researcher collects both quantitative and qualitative data, approximately at the same time, and then the two datasets are integrated, leading to interpretations being derived at the overall results stage. If contradictions or incongruencies are found, these are explained or examined further.

4.3.4.2. Explanatory Sequential Design

The explanatory sequential mixed method "*is one in which the researcher first conducts quantitative research, analyzes the results and then builds on the results to explain them in more detail with qualitative research*" (Creswell and Creswell, 2022; p.52). The sequence followed entails quantitative data collection and analysis, followed by qualitative data collection, to further elaborate on the outcome of the quantitative research. This method is useful for those researchers whose topic of research has a strong quantitative orientation. However, researchers must be careful vis-à-vis the challenges one would face while adopting this research method. For instance, identifying the quantitative results to carry on with further exploration, and identifying sample size (which may not be equal) at each stage of the research.

4.3.4.3. Exploratory Sequential Design

The exploratory sequential mixed method research design is at the opposite end of the continuum of the explanatory – exploratory sequential mixed methods. In this research method, the research begins with a qualitative research approach that explores the responses of the subjects participating in the research. This dataset is then analysed, and the findings from this phase are subsequently used to build the quantitative research which is the following phase of research. The outcome of the qualitative research phase could be used to build an instrument that is needed for collecting responses from the sample under examination. It is also possible that the outcome of the qualitative research could be used to identify appropriate instruments which could help in conducting the quantitative phase that would follow; or to develop an intervention for an experiment; or to design and develop an application or website; or to determine variables that need to be studied in the quantitative study that would follow. However, researchers must be cognisant of the challenges that affect this type of research, which include concentrating on the suitable qualitative findings to be employed in the research, and the appropriate selection of samples for the two separate, but related, phases of research.

4.3.4.4. Embedded Design

With regard to the embedded mixed method research, this research normally relies on the arguments of Cohen et al. (2017; p.39) and Creswell and Clark (2011). In this method, it is argued that each one of the research questions needs both quantitative and qualitative data, for instance:
- Qualitative data could be embedded in, or supplemented, by quantitative data (e.g. experiments), or,
- the reverse where quantitative data could be embedded in, or supplemented by, qualitative data (e.g. case study).

In the first scenario, qualitative data could be used to explain, and interpret, the quantitative data obtained. In the second scenario, quantitative data could be used to generate more generalised data on the case (e.g. frequencies). In either scenario, the researcher tends to keep both the qualitative and quantitative data separate. Moreover, it is important to note that in embedded design, one of the two types of datasets tends to have priority over the other. For instance, qualitative data could be added to largely quantitative research or vice versa. In either scenario, the sequence in which the data needs to be collected gains currency, and a decision needs to be made by the researcher. The literature indicates that data could be collected concurrently and/or sequentially. With regard to the challenges, the main challenge is found to occur at the definitional and scoping stages. For instance, how the mixed method is conceptualised and organised, what aspects the method comprises, and the way it is conducted, are important considerations. Researchers need to be cognisant of the pitfalls. For instance, there can be a challenge with regard to embedding one type of data into another, if the researchers do not properly prioritise one set of data collection and analysis over the other.

Steps involved in typical mixed method research approaches are provided in figures 4.3 and 4.4.
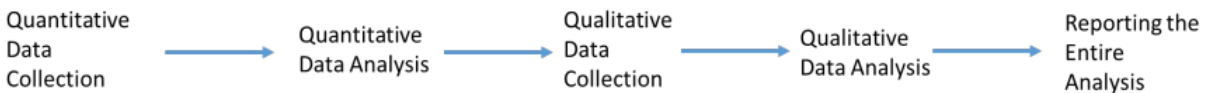
Figure 4.3: Explanatory sequential mixed method (Source: Taherdoost, 2022)
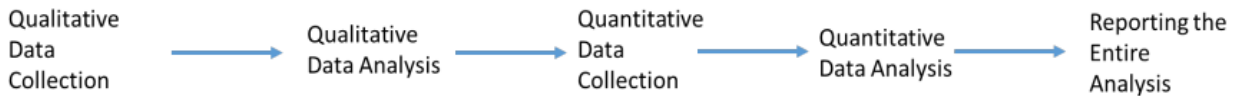
Figure 4.4: Exploratory sequential mixed method (Source: Taherdoost, 2022)

Table 4.7 provides a comparison of the three methodologies. The comparison clearly illustrates that a mixed method approach provides the researcher with an advantage. This is because such a method draws from both the strengths of both qualitative and quantitative traditions.

Within regard to value co-creation literature, previous studies, for instance, Saha et al. (2022), argue that the mixed method research methodology is the least used amongst the three methods outlined in this chapter. This has resulted in a lack of a holistic understanding of the concept of value co-creation as it occurs in different contexts.

#	Qualitative Method	Quantitative Method	Mixed Method
1.	Methods that are emerging	Pre-determined	Includes both emerging and pre-determined methods
2.	Open-ended questions	Closed-ended questions or research instrument-based questions	Includes both open-ended as well as closed-ended questions
3.	Data collected through interviews, observations, published documents and audio-visual means	Data collected pertains to performance, attitude, observational and census	This method draws from multiple forms of data drawing on various possibilities
4.	Analysis is based on text and images	Analysis is based on statistics	Involves both text and images on the one hand and statistics on the other.
5.	Findings pertain to themes, patterns and interpretations.	Findings based on interpretation of results obtained through statistical analysis.	Interpretation based on an evaluation across databases.

Table 4.7: Comparison of qualitative and quantitative research methods (Creswell and Creswell, 2022; p. 53)

4.4. Research Framework

The preceding discussions provided a detailed overview of the various philosophical underpinnings, considerations, and their implications for research. Crotty (1998) argues that a research framework deals with the epistemology chosen for the research, the theoretical perspective adopted, the methodology and method used in the research. Accordingly, the research framework developed and adopted for this study outlines the choices made for this thesis vis-à-vis the epistemological and ontological positions taken by the researcher, in addition to the research approach and method employed. These are detailed, with justification, in the following section.

4.4.1. Research Philosophy Adopted

This research revolves around value co-creation as occurring in a classroom setting in a higher education context. If the researcher were to choose either a positivist or an interpretivist philosophy, the understanding of the value co-creation as concept would suffer and be lacking. For instance, the choice of the positivist stance may help understand a single reality of value co-creation occurring in the classroom. However, if the question 'how' as related to the process is not addressed, involving the consideration of multiple realities, then HEIs would not be able to identify ways to address individual student needs. Every student

should be considered as a value co-creator in the dyadic process of teaching and learning. Student needs are diverse. While, if interpretivism were to be chosen as the research philosophy guiding this study, it would be possible to identify multiple realities through subjective measures, however, it will be difficult for HEIs to objectively decide on those realities and confirm them. Generalisability would not be possible. This will lead to ambiguities surrounding the question of how to deal with the collective student community. In such a situation, it would be more informed to use an alternative philosophy, which is offered by post-positivism, wherein the advantages of explaining the multiple realities can enable a more holistic understanding of those realities. Value co-creation represents a complex phenomenon that involves such subordinate constructs as co-production, value-in-use, and related constructs such as individual innovation behaviour, innovation competencies and student benefits. It would be difficult to understand, or adequately explain, the occurrence of value co-creation in a comprehensive manner without the use of a mixed-method related philosophy such as post-positivism. The rationale for this choice is provided under section 4.4.2 in the following section.

4.4.2. Justification of the Research Ontology

The nature of reality, or realities, concerning value co-creation need to be explained and understood. The diverse nature of universities, teaching faculty, and students, makes a classroom a complex phenomenon where both singular objective and multiple subjective realities matter. As explained earlier, objective ontology does not provide answers to questions about the 'how' in relation to students' feelings with regard to value co-creation. Neither would such an ontology allow the researcher to answer how faculty can enable students to develop innovation behaviour. Whereas subjective ontology may allow the researcher to better understand the various realities, from idea generation to co-production. However, it may not be possible to confirm those realities as a whole or control them. This would require the use of objective ontology.

Post-positivism is the best suited research philosophy, given that it combines both ontologies, leading to the explanation and understanding of the concept of value co-creation, whereby subjective ontology will complement the objective ontology and vice-versa. Using such an ontology, the researcher will be able to investigate causal relationships and integrate qualitative date, leading to a richer and more holistic understanding of the phenomenon under study. Thus, this research utilises a combination of objective and subjective ontologies within the context of a post-positivist research philosophy.

4.4.3. Justification of the Research Approach

Given that this study adopts both the objective and subjective ontologies, in combination, the use of both deductive and inductive approaches would be incumbent. This research approach is directly linked to both

the research philosophy and the related ontological considerations. Accordingly, this study uses deductive reasoning to explain the objective and singular view of reality. Additionally, this study uses inductive reasoning to explore the subjective view of multiple realities. Two separate datasets are collected for analysis.

4.4.4. Justification of the Research Method

This research uses a mixed-method perspective. This is due to the need to collect both quantitative and qualitative data from the student population under study. As such, this research uses a combination of both quantitative and qualitative data collection methods, termed mixed method data collection.

With regard to the theoretical perspectives, it is clear from previous studies concerning the seven variables investigated in this research that the S-D logic theory, the theory of co-production, the theory of experience-economy, the social-exchange theory, and the Innovation Competencies Development (INCODE) Barometer could be applied to explain the relationships between the different variables. This has been fully explained in Chapter 3. Following the discussion on the research framework that has been developed for this study, the subsequent section addresses the rationale for the choice of mixed methods, followed by an explanation of the specific research design developed for this research.

4.4.4.1. Rationale behind the Choice of the Mixed Method Research

The rationale for the choice of the mixed method research could be explained by using the research questions that this research aims to answer, an argument that is supported by Saunders et al. (2023). For instance, research question RQ1 reads as follows: What factors contribute to the value co-creation process in a higher education institution during classroom interaction between instructors and students that support students to innovate/invent and how are they related to each other? This research question could be divided into two parts. The first part asks the question "What factors contribute to the value co-creation process in a higher education institution during classroom interaction between instructors and students that support students to innovate/invent". This points towards a causal-link, therefore causal research. There could be a number of factors which can affect the value co-creation process in a classroom setting. This implies the presence of two variables: One causing the value co-creation process, and the other affecting the value co-creation itself. This will necessitate the use of hypotheses that would enable the researcher to postulate certain theoretical relationships concerning the variables involved. This points towards the use of a quantitative research method, an argument that is supported by Bougie and Sekaran (2019).

However, the second part of the question is "how are they related to each other?" which is an exploratory question that requires the use of a qualitative research method. The exploration should reveal the nature of the relationship between the variables, which necessitates the study of the quality of relationship. This could entail the use of observations collected using interviews. These arguments are supported by Bougie and Sekaran. Hence, the research question RQ1 requires the use of both causal study and exploratory study. The use of quantitative and qualitative research methods in one research is called mixed method research (Saunders et al., 2023). Similar arguments can be extended to the choice research method concerning research questions RQ2 and RQ3. Thus, the rationale for the choice of the mixed method research is explained.

4.5. Research Design

The types of inquiry undertaken by the researcher provide for specific direction in relation to the adoption of specified steps in a research design. Those inquiries could be grounded in qualitative, quantitative, or mixed method research (Creswell, 2013). Research designs are also called research strategies of inquiry (Denzin and Lincoln, 2011). There are different types of research designs that one could choose from. Widely used designs include quantitative designs, qualitative designs, and mixed method designs (Creswell, 2013). A comparison of the three designs is provided in table 4.8. Some of the terms used in table 4.8 are explained later in the discussions provided immediately after the table.

#	Typical Feature	Mixed Method	Quantitative	Qualitative
1.	Philosophical assumptions	- Knowledge claims are pragmatic	- Knowledge claims are positivistic	- Knowledge claims are constructivist or transformative
2.	Strategies of inquiry	- Sequential, convergent and transformative	- Surveys and experiments	- Phenomenology, case study, ethnography, grounded theory and narrative
3.	Methods used	- Both open and closed-ended questions are used - Both emerging and predetermined approaches are used - Both qualitative and quantitative data and analysis used	- Closed-ended questions, predetermined approaches, numeric data (could include some open-ended questions)	- Open-ended questions, emerging approaches, text or image data
4.	Practices employed by the researcher	- Both qualitative and quantitative data is collected - Both the data are mixed based on a rationale developed - Data is integrated at different stages of the research - Visual pictures of the research procedure is presented - Practices followed in both qualitative and quantitative methods are followed	- Conducts tests or theories are verified or provides explanations - Variables of study are identified - Variables in questions are related to hypotheses - Tests of reliability and validity are used - Numbers are used to measure information and observations - Unbiased approaches are used - Statistical procedures are used	- Data collected relates to participant meanings - The research is about a phenomenon or concept - Researcher involves personal values into research - Study of the context or settings in which participants are situated is part of the research - Accuracy of the results are validated - Interpretation of the data made in research - An agenda for change or reform is created - Collaborates with participants - Text analysis is conducted

Table 4.8: Comparison of the research design of the three methods (Creswell and Creswell, 2022)

The comparison in table 4.8 of the three methods provides a clear illustration that mixed method research involves a combination of steps that are followed in both quantitative and qualitative research methods. An appropriate research design enables the researcher to collect essential data for analysis. Towards this end, this research uses the steps identified by Bougie and Sekaran (2019) and the ones provided in table 4.8.

a. **Purpose of Study:** The purpose of study in a mixed method research could be sequential, convergent, or embedded. These are already explained in section 4.3.4. This research predominantly involves the quantitative research method, as a dominant approach. The qualitative research outcomes are used to support the outcomes derived from the quantitative research method. The purpose is to explain how and to what extent the co-production of student benefits influences the constructs student benefits, value-in-use, and individual innovation behaviour on the one hand, and how innovation competence affects student benefits on the other. In addition, the construct student benefits is considered to include such components as personalised experience of the students. It is important to understand the value of such an experience by probing those students through an interview. Measuring student benefits as a construct using objective measurement does not capture nor articulate the various experiences that are unique and personal to the student. Leem (2021) states that personalised value-in-use, co-produced in a classroom, could be remembered as an experience by students over a long time. How long, and why, the students should remember, are questions that could not be easily captured by the instrument used by Leem (2021), which is a limitation. In another instance, the qualitative research study conducted by Caldwell et al. (2021) found that in the process of learning student experience should be personalised through academic and emotional support according to the individual needs of the student. This implies that the professor should take into account the personal situations of students to enable them to learn better by devoting personal attention to the students individually. The lack of understanding vis-à-vis a student's personalised learning needs might affect the learning process. Such information could not be acquired through the survey instrument designed to collect objective data, as closed-ended questionnaires do not provide an option to deviate from the specific statements outlined in the instrument. Nevertheless, given that value co-creation as a concept has been dealt with using the quantitative methodology (e.g. Guan et al., 2019), this research has adopted the quantitative method to collect data and analyse the various relationships developed for study. Furthermore, this research has been built upon the research efforts of Leem (2021) who has studied the concept value co-creation in a classroom setting. However, this research takes a deviation from the conceptualisation of Leem (2021) and measures the concept of value co-creation and its components using both

154

quantitative and qualitative methods involving data collection and analysis in sequence (e.g. figure 4.3). This has paved the way to garner a better understanding of the various relationships postulated in this research using the sequential method of data collection. A convergent method requires conducting the quantitative and qualitative research in parallel, which is deemed by the researcher as being inadequate, owing to the fact that this study builds on an already published research outcome which is predominantly quantitative in nature. Finally, Creswell and Creswell (2022) argued that transformative research is a type of mixed method research that uses both quantitative and qualitative data to understand such areas as ethical aspects of participants, to build trust, and ultimately achieve goals that concern the enhancement of social justice and human rights (Mertens, 2009). However, seeing as these are not areas that this research concerns, the transformative research method is not considered relevant for the purposes of thesis.

b. **Type of Study:** There are different types of study including exploratory, descriptive, or causal (Bougie and Sekaran, 2019). Bougie and Sekaran (2019) explain that exploratory research relates to the study of a specific phenomenon that is not well understood, where current research results are not clear, or the related topics are highly complex. Exploratory studies could be undertaken when insufficient theoretical support is available to explain the phenomenon under study. This type of research involves a qualitative research method and the collection of data through informal discussions, interviews, focus groups, or case studies. Furthermore, according to Bougie and Sekaran exploratory research is fundamentally flexible in nature. Typical examples of an exploratory study concerning value co-creation include the studies by Eijk and Steen (2016) and Bandola-Gill et al. (2022) who used qualitative methods to understand the concept of co-production.

Sekaran and Bougie (2016) argue that descriptive studies on the other hand describe the topic of research. For instance, if the researcher had intended to know how many students in classroom had a liking or preference to innovate, then a descriptive study would allow for describing the liking and/or preference of the students in detail. Descriptive studies are normally designed to gather data that allows the researcher to describe entities including persons, organisations, products or brands, events, or situations. The nature of descriptive studies could be qualitative or quantitative, for instance, collection of quantitative data on factors such as motivation levels, sales figures, or growth rates (Sekaran and Bougie, 2016) or qualitative data such as information on students' innovation behaviour in the classroom. Examples of descriptive studies used in value co-creation literature

include the article by Etgar (2008) who studied the consumer co-production process using a descriptive model of the consumer.

Bougie and Sekaran (2019) claim that causal studies are concerned with the testing of whether a variable causes change in another variable or not. In this type of study, the researcher normally aims to delineate factors that are causes of concern. An example could be "*what is the influence of co-production of value in a classroom setting on student benefit?*" An example of the causal study is the one conducted by Leem (2021); one of the papers on which this research has been built on.

Within the context of value co-creation in a classroom setting, this study examined value co-creation using a combination of causal – correlational and exploratory study types. The main variable in this research is co-production and its influence on student benefits. This was studied in a classroom setting, taking into account the intervention of value-in-use of the co-produced value and individual innovation behaviour. Moreover, it was argued in chapter 3 that innovation competence, as a determinant of individual innovation behaviour, has a role to play in defining the influence of co-production of innovation on student benefits. The conception that the constructs co-production and innovation competence can operate together, and their combined influence on individual innovation behaviour, are aspects not clearly known or explained in the literature before. This paves the way to gain clarity on how benefits are derived by the students through the value co-creation process. While the occurrence of value co-creation in a classroom setting is not a single static event, but rather a dynamic situation, however, in many cases causal studies may not provide or capture the cumulative experience gained by the student. Although social exchange theory provides a basis to understand how exchange takes place in the value co-creation process, it cannot adequately account for the dynamic nature of value co-creation in the exchange process. If one has to understand how dynamic value co-creation can occur in the value co-creation process using the social exchange theory, there arises a need to explore a better way to theorize the social exchange theory that can explain the dynamic nature of value co-creation in a classroom setting. Learning takes place within the classroom over a period of time, across many courses and semester. Innovation behaviour is continuously developed in the classroom in a gradual manner over a protracted period of time. Accordingly, in such an environment the learning curve may not be a linear function. Thus, such non-linearity cannot be explained by causal – correlational studies as those studies are largely based on linear models. Extant literature states that the cognitive ability of human beings is largely occurring in an increasingly complex, non-linear, and dynamic environment which makes learning a non-linear process (Vargo and Lusch, 2017; Hotambekovna,

2022). Additionally, non-linear causal models are difficult to deal with, unlike linear models. Such non-linear models may fail to detect indirect causal relations (Zhang and Hyvärinen, 2016). Furthermore, the literature points to the innovation process being increasingly understood as a complex non-linear process (Mele et al., 2011). This further adds to the difficulty in understanding the function of innovation through simple correlational studies alone. An example of this is found in the arguments contained in the innovation networking literature which show that innovation is an integrative process that integrates the various stakeholders (Kazadi et al., 2016). Additionally, it is argued that technological processes are developed through networks in which many different agents are involved. Multiple interactions take place between those agents, which are found to be an interactive, non-sequential, and non-linear process (Roy et al., 2004; Kodama, 2007). These discussions highlight the need to supplement the causal – correlational study by an exploratory study.

c. **Study Settings:** This research was conducted in a non-contrived setting. This means the study dealt with a normal classroom environment where teaching and learning proceeds without intervention. Contrived settings are similar to laboratory-based settings where rigorous causal studies are conducted. Classroom, or organisational, research could be conducted both in non-contrived and contrived settings. In this research non-contrived research settings were already available for undertaking this study.

d. **Unit of Analysis:** For the quantitative study, the unit of analysis was the student studying in a private higher education institution in the Kingdom of Bahrain. This unit indicates the aggregation level of the collected data during the following data analysis step. Each one of the responses was considered by the researcher to be an individual data source. As for as the qualitative phase, the unit of analysis consisted of stakeholders, including students, alumni, faculty members, and employers.

e. **Time Horizon of the Study:** The time horizon of study could be one of two, namely, cross-sectional or longitudinal. Cross-sectional studies involve collection of data one-time, or in one-shot, while longitudinal studies involve collection of data over two, or more, times to answer the research questions. In this study cross-sectional data was collected with regard to both the quantitative and qualitative studies.

f. **Extent of Researcher Interference with the Study:** It is important for the researcher to be aware of the possibilities for interference. Within the context of the quantitative study, it can be said that since the research was conducted in the actual setting, the researcher was away from the participants. This had the effect to minimise any interference by the researcher in the data collection process. The participants had no knowledge about the presence of any bias. However, with regard to the qualitative study, the researcher conducted the semi-structured interviews, which inherently required the interference of the researcher. Accordingly, an element of bias can be said to have influenced the collection of qualitative data (Apuke, 2017; Bougie and Sekaran 2019; Saunders et al., 2023).

g. **Data Collection:** Two types of data were collected, namely, primary and secondary data. Primary data was collected from the students of the private University in Bahrain, using a research instrument in the quantitative data collection phase. Additionally, four different stakeholders of the private University were involved in the semi-structured interviews, as part of the qualitative data collection phase. Secondary data was collected from published material available on the internet through online databases. The secondary data used consisted, primarily, of peer-reviewed journal articles.

A data collection strategy was devised for this research, whereby mixed method research was undertaken. This entails specific conditions that need to be satisfied (Creswell and Creswell, 2022). This aspect is discussed in detail later in this chapter.

h. **Data Analysis:** Given that this research constitutes a mixed method study that follows the explanatory sequential procedure, the data analysis was conducted separately for the quantitative and qualitative research methods. These are discussed in sections 4.5.1 and 4.5.14.

4.5.1. Research Methodology Strategy

Methodology literature shows that researchers adopt different strategies in their inquiry. These include survey research, experimental research, observation, case study, phenomenological research, heuristic research, grounded theory, action research, feminist standpoint research, and discourse analysis (Crotty, 1998; Sekaran and Bougie, 2016). A clearly articulated research strategy will be needed to answer the research questions and achieve the research objectives set for this research. Thus, the research questions and the objectives set for this research determine the research methodology to be used. The perspective of the researcher with regard to the conduct of good research in, addition to the availability of resources and

time, can also be important determinants of the choice of research methodology (Bougie and Sekaran, 2019).

As mentioned in section 4.4.4, the mixed method research methodology has been chosen for this research. This implies the use of quantitative and qualitative research methods in this research. Given that both quantitative and qualitative research methods are involved, it was important to decide the sequence in which both the methods will be implemented. This, in turn, depended on which of the two methods needs to be more dominant, or whether the two methods should have equal weightage. If the quantitative method is assumed to be dominant, then the qualitative method would play a less significant role and would follow the quantitative data analysis. This is called the explanatory sequential research design (figure 4.3). However, if the qualitative method is assumed to be the dominant method, then the quantitative method would follow the qualitative data analysis and play a less significant role. This is called the exploratory sequential research design (figure 4.4). Alternatively, a third design called the convergent (parallel) mixed method could be followed in which results are obtained by using the quantitative and qualitative results, whereby both sets would be treated with equal importance. This would involve a comparison for supportive and non-supportive roles of the two methods. A decision had to be made at this stage as to the appropriate choice of research strategy which is contingent on the following criteria suggested by Creswell and Creswell (2022).

4.5.1.1. Factors Affecting the Choice of a Mixed Methods Strategy

The following section provides an overview of the factors that were considered as important in the determination of the choice a particular mixed methods strategy. These factors are related to the intent of the research procedure as well as the practical considerations.

i.   **Identification of the Mixed Methods Research based on Outcomes Expected or Intent:** This criterion suggests that the researcher must finalise the outcome expected of a mixed methods project, and the type of mixed method strategy that is to be used. Such outcomes could be shaped by including and integrating both quantitative and qualitative data.

ii.   **Choice based on Integrating the Data:** Integrating collected data is a choice that is recommended to be exercised by a researcher if the researcher intends to go beyond considering the outcomes anticipated alone. This will usually be required when a researcher wants to combine quantitative and qualitative data, to have a side-by-side comparison of the two datasets, and deal with data

transformation and joint display. Through this choice, the researcher could use the analysis of one dataset to build on the other.

iii. **Choice based on Timing of the Data Collection:** A researcher who exercises this choice could be using an explanatory sequential or exploratory research design, whereby data is collected sequentially. Datasets are collected in succession. Where datasets are collected concurrently, this is referred to as the convergent strategy. The timing of the data collection is considered essential in all types of mixed method.

iv. **Choice based on Emphasis Placed on Each Database:** Researchers exercising this choice would have reasons to either emphasise a particular dataset or place equal emphasis on both datasets. The weightage placed on a particular dataset gains currency. The weightage assigned would normally be based on a number of criteria. For instance, how the investigation starts (a quantitative method emphasising on a theory, or a qualitative method emphasising on a personal story), the depth and sophistication aimed for in collecting quantitative or qualitative data. Hence, equal weightage on datasets will constitute a convergent strategy, whereas emphasis on the quantitative method/dataset will lead to explanatory sequential design, and an emphasis placed on qualitative study/data would lead to an exploratory sequential design.

v. **Choice based on the Type of Research Design Needed for a Field:** This choice depends on the inclination of a research field towards a certain mixed method. Regardless of the how the study began, it may be necessary for the researcher to decide whether the choice should be an explanatory sequential strategy, where the outcome could be oriented towards a measuring instrument. Where the research starts with an exploration, the exploratory sequential strategy could be used. In some fields, where there is a need to collect data efficiently, the convergent strategy might be best suited.

vi. **Choice based on a Research Team or a Single Researcher:** Where time is a constraint, a single researcher could use a convergent strategy. Where designs are complex, then teams can be used to collect data in multiple phases, either through an explanatory sequential design or the exploratory sequential design.

vii. **Choice of the Research Strategy for this Research:** In this research project the expected outcome of the research study undertaken is the testing of a theoretical model. This is done using a

quantitative study to gain knowledge on how the various theoretical relationships are supported by theory. This points towards an explanatory study.

This research undertakes to identify value co-creating factors that affect student benefits in a classroom setting, and how those factors are related to each other while value co-creation occurs. Additionally, the exploration of the nature of the value co-created, and how value is co-created in a classroom interaction, is part of the scope of this study. Finally, as an outcome, this research is expected to elicit knowledge regarding the levels of interest students may have to innovate in a classroom, leading to possible grouping of those students. These outcomes have many different components that may not be easily understood if a quantitative method is used, alone. While it is possible that the factors may be elucidated using a monomethod (e.g. quantitative), nevertheless, many important hidden aspects would likely be missed. To overcome this situation the researcher deemed it necessary to employ a qualitative study. Thus, the outcome and intent demonstrate that there is a need to establish that there are value co-producing factors which assist in co-producing student benefits. This was done using a quantitative study. Subsequently, a qualitative study was undertaken to understand feelings and processes surrounding the generation of innovative ideas as well as the consumption process (i.e. value-in-use). This could be better understood through a method by which the outcome of the quantitative research phase would be corroborated using the qualitative study. In such a scenario, the quantitative study is conducted first, while the qualitative study follows next. Accordingly, the explanatory sequential design strategy was adopted. Data was collected in successive phases.

With regard to the emphasis on the datasets collected, the researcher had to place greater emphasis, hence higher weightage, on the quantitative dataset, owing to the eventual intent or outcome expected, which is the confirmation of the theories applied to test the phenomenon of value co-creation. The literature provided tested models in the fields of value co-creation, co-production, innovation behaviour, value-in-use, student benefits, and innovation competence. As an example, Leem (2021) applied S-D theory, theory of co-production, social capital theory, experience-economy theory, and social exchange theory when explaining the relationships between co-production and value-in-use, value-in-use and student benefits, and co-production and student benefits. Similarly, Marín-García et al. (2013) have tested the relationship between the individual (personal), interpersonal, and networking dimensions on the one hand, and innovation behaviour on the other, using the INCODE barometer, social exchange theory, and S-D logic theory. The theory behind the innovation competence model was informed by Ostrom (1996). Thus, the researcher has sufficient theoretical support, and a solid basis, to investigate using the quantitative research method as the dominant methodology.

Additional areas of research, covering issues pertaining to the development of innovation behaviour in student (in a classroom setting) are required. More specifically, the generation of new ideas, personal aspects, interpersonal aspects, networking aspects, knowledge acquired outside classroom, benefits that could accrue over a period of time beyond graduation, and the experience the students would gain vis-à-vis innovation for use beyond graduation. Therefore, there was a need to qualitatively investigate, through semi-structured interviews, the factors related to how value co-creation occurs in a classroom setting through the process of teaching and learning. The semi-structured interview process was expected to enable the researcher to collect data about the understanding of the various concepts mentioned above, as involved in value co-creation of the different stakeholders. The outcome of the data analysis of the quantitative phase was used to develop questions needed for the semi-structured interview. The outcome of the data analysis of the qualitative phase was used to inform the results of the quantitative data analysis. Thus, the result was the testing of the theoretical model using the outcomes of both quantitative and qualitative methods in sequence. There was no need for the use of an exploratory sequential method, as the outcome aimed in this research was clear. In other words, there was no need to explore the value co-creation process in a classroom setting, as adequate research outcomes are already published in the literature to apply well established theories. Hence, the exploratory sequential design was not used. Additionally, the convergent strategy was also deemed unnecessary, as equal weightage was not attached to the datasets collected. There was no need to have an explicit juxtaposition, or comparison, of the two datasets. Furthermore, the researcher could manage the research in a way such that the data could be collected in sequence, as time was not a major constraint. Thus, as a research strategy, the explanatory sequential mixed method design was used in this research. This is in line with figure 4.3. Following the determination of the specific research strategy, the subsequent steps involved defining the data collection process through the quantitative and qualitative data collection phases. This is described in the following section.

4.5.2. Target Population

The primary target population for the quantitative study is the students studying in multiple disciplines in a higher education institution. The target population for the qualitative study included the stakeholders involved in the value co-creation process. This includes the students including student innovators, instructors, alumni, and employers. Thus, this research conducted a survey amongst students to answer part of RQ1, RQ2 and RQ3, while semi-structured interviews were conducted to address the other part of RQ1, RQ2 and RQ3. The survey is expected to answer the questions concerning factors contributing to the value co-creation process in a higher education institution, during classroom interaction between instructors and students that support students to innovate/invent. Additionally, the survey will address the nature of the values co-created during the value co-creation process in a classroom, and the levels under which students

could be classified and engaged to innovate as part of the value co-creation process. Semi-structured interviews are expected to provide data that could be used to answer questions regarding how the value co-creation factors are related to one another, and how these factors occur during the value co-creation process in a classroom, in addition to how one may classify the students according to different levels. The research activities involved in each one of the phases is narrated in the following section, beginning with the quantitative data collection phase, and followed by the qualitative data collection phase, as per the chronology of the sequence adopted. The researcher chose undergraduate students as the target population, to the exclusion of postgraduate students, given that the bachelor degree-seeking students spend a considerably longer period of time studying on their respective programmes. This means the opportunity for continuous interaction is present, with students having the potential to develop more meaningful and longer lasting relationships at the university, with their professors, while still in the course of study. Additionally, a majority of postgraduate students will normally be employed, with a wider variation in terms of age. In the case of bachelor degree students, a greater percentage will be full-time students that are not employed at the time of the study. This means any innovation behaviour developed will be primarily accruing out of their study experience, beginning in the classroom, as they will not typically benefit from other types of formal education/training beyond the purview of the academic provision at the university. Finally, before commencing the empirical phase of the study, ethical approval was obtained from Brunel University London to conduct both the pilot survey, the main survey, as well as the semi-structured interviews.

4.5.3. Quantitative Data Collection Phase

A private university in Bahrain was selected. The selected university offers a variety of programmes at the undergraduate level, and is well regarded, with a strong reputation for the quality of its academic provision. The university is considered amongst the best in the country, as supported by its international standing in several international league tables. The university had graduated a number of cohorts already, for all the undergraduate bachelor degree programmes that were on offer at the time of the study, with an alumni base comprising several thousand students. The university was the only private university offering doctoral programmes in Bahrain. Emphasis on research in that university was evident which is an important characteristic that could be related to innovation, invention, and discovery by students and faculty. Undergraduate students were chosen for study. Students were enrolled on 11 programmes offered by the university across various disciplines (Table 4.9).

#	Programme
1.	Bachelor's Degree in Accounting and Finance (BSAF)
2.	Bachelor's Degree in Banking and Finance (BSBF)
3.	Bachelor's Degree in Computer and Communication Engineering (BSCCE)
4.	Bachelor's Degree in Economics and Finance (BSEF)
5.	Bachelor's Degree in Information Technology (BSIT)
6.	Bachelor's Degree in Management and Marketing (BSMM)
7.	Bachelor's Degree in Management Information Systems (BSMIS)
8.	Bachelor's Degree in Mass Communication and Public Relations (BSMCPR)
9.	Bachelor's Degree in Mobile and Network Engineering (BSMNE)
10.	Bachelor's Degree in Multimedia Systems (BSMS)
11.	Bachelor's Degree in Interior Design (BSID)

Table 4.9: List of programmes offered in the private university chosen for conducting research

Both male and female students were studying in the university numbering over a 900. The university staff included well qualified teaching faculty, from diverse nationalities. The system of education followed in the university enabled students to discuss ideas and concepts freely in the classroom. There was evidence of students who had innovated at different undergraduate levels in the university, including at least one registered patent. Scientific research and scholarly activity were emphasised in the university as a matter of policy. Industry collaborations were being established, and entrepreneurial activities were regularly conducted in the university. This indicated that innovation, as a concept, was considered important. The presence of a university Centre for Invention provided encouragement to the researcher to investigate value co-creation at this university. In comparison, many other universities in Bahrain could not compete with this university vis-à-vis the many of the aspects mentioned above.

4.5.4. Sampling Strategy

The researcher used a sampling strategy that ensures efficiency in conducting the research. It was not possible to contact all students, on an individual basis, hence it was important to follow a sampling strategy. The sample was calculated based on the formula suggested by Cochran (1977). Equation 4.1 provides the equation.

$n_0 = [t^2 \text{ x } s^2] \div d^2 \rightarrow$ (4.1)

where n0 = sample size; t = the t-value for a particular confidence level (confidence level usually used by researchers is 95%); s = estimate of standard deviation (calculated as s = number of points on the scale ÷ number of standard deviations)

In this research, a five-point scale was used as part of the research instrument. Consequently, the number of standard deviations to be taken into account was 4 (two on either side of the mean). 'd' = acceptable margin of error was calculated using the formula (number of points on primary scale multiplied by acceptable margin of error). Thus, the following values were used in determining the sample size.

t = 1.96 (for a confidence level of 95%)

s = 5 ÷ 4 = 1.25

d = 5 x 0.03 where 0.03 is the assumed margin of error = 0.15

Hence, from equation (4.1)

$n_0 = [(1.96)2 (1.25)2] \div (0.15)2 = (3.84) (1.56) \div (0.0225) = 5.99 \div (0.0225) = 266.22$

Sampling strategies are broadly classified as either probability sampling or non-probability sampling (Sapsford and Jupp, 2006; Clark et al., 2021). The different types of sampling procedure used in research include simple random sample, systematic sample, stratified random sampling, and multi-stage cluster sampling. For the purposes of the quantitative study undertaken by the researcher, a simple random sampling procedure was adopted. This is because random sampling offers every participant with an equal opportunity to provide a response. This was deemed the most appropriate sampling procedure. However, random sampling is known to suffer from the need to prepare a list of all participants, which can be tedious (Sharma, 2017). Nevertheless, this was deemed appropriate and manageable.

4.5.5. Use of Survey Strategy for Data Collection

Strategies used for quantitative data collection include either experimental or survey strategies. The latter strategy was deemed as offering certain relevant advantages compared to the former. Such advantages include the fact that surveys are considered highly economical, enable collection of substantial quantitative data, and provide an opportunity for data analysis that includes both descriptive and inferential statistics (Saunders et al., 2009). In contrast, the experimental design suffers from limitations which include difficulty in obtaining data, and the possibility that the data obtained may not end up being useful in management studies research (Saunders et al., 2009).

4.5.6. Data Collection

Both primary and secondary data were collected for this research. Primary data was collected using a research instrument. Secondary data was collected using published literature. The data collection instrument used is described in the following section.

The data collection instrument was developed based on peer-reviewed scientific publications. The instrument constituted a 5-point Likert scale-based questionnaire. This provides an efficient way to collect data in particular field studies. Quantified information could be collected using such instruments from a specific target population (Ticehurst and Veal, 2000) namely undergraduate students of a higher education institution. While questionnaires provide advantages such as greater efficiency and lower cost, however, they can be affected by confidentiality issue (Hussey and Hussey, 1997; Bougie and Sekaran, 2019). The number of items, and the researchers whose work contributed to the development of the instrument, are provided in table 4.10.

#	Construct Measured	Number of Items	Scale	Author(s)
1.	Co-production	12	5-point Likert	Ranjan and Read (2016), Dollinger et al. (2018), Dziewanowska (2018)
2.	Value-in-Use	11	5-point Likert	Ranjan and Read (2016), Dollinger et al. (2018), Dziewanowska (2018)
3.	Student Benefits	4	5-point Likert	Dollinger et al. (2018)
4.	Personal Dimension	12	5-point Likert	Marín-García et al. (2017)
5.	Interpersonal Dimension	8	5-point Likert	Marín-García et al. (2017)
6.	Networking Dimension	4	5-point Likert	Marín-García et al. (2017)
7.	Individual Innovation Behaviour	6	5-point Likert	Scott and Bruce (1994)

Table 4.10: List of constructs, items, scale used and authors' publications upon which the instrument was developed

The instrument is provided in Appendix VI. It has two sections. The first section addresses the demographic details, while the second section addresses the constructs to be measured. Once the instrument was developed, it was subjected to a pre-test and pilot test. This is a recommended procedure, and standard practice, for quantitative instruments (Sekaran and Bougie, 2016; Creswell and Creswell, 2022). Sekaran and Bougie (2016) argue that a pre-test provides an opportunity for the researcher to assess participants' understanding of the research instrument. This is important in order to ensure that no problems occur with regard to wording or measurement. The pre-test was conducted with a small group of participants (Sekaran

and Bougie, 2016) which included two (2) academics which were assigned, at random, by the university in which the study was conducted. Similarly, two (2) researchers and one (1) marketing practitioner were assigned by the same university. Minor changes were incorporated into the instrument at this stage, as suggestions from the group of participants were very limited. One of the suggestions, for instance, included the removal of assigned codes to the statements. The pre-test was followed by the pilot test.

The pilot test was planned and conducted during August/September 2022. This provided the basis to establish content validity of scores of the questionnaire. Additionally, this provided the initial assessment of the internal consistency of the items which represents the reliability of the instrument and the data collected. Internal consistency measures the reliability of the instrument used to collect data. Content validity refers to one of the tests that examines whether items measured the content they were intended to measure (Creswell and Creswell, 2022). Reliability and validity are two important aspects that are recommended as essential tests that need to be conducted at both the pilot test level, as well as the main survey level (Pallant, 2020; Bougie and Sekaran, 2021; Creswell and Creswell, 2022). At the pilot test level, reliability and validity tests helped in improving the format and instructions for the participants. These tests are discussed in the following sections.

4.5.7. Reliability

The reliability measurement provides a view of the replicability of the results obtained (Bryman, 2014). This test is applied to evaluate the reliability of a research instrument used to collect quantitative data (Cohen et al., 2017). Recommended measures used to test reliability are Cronbach's alpha, inter-item correlation, and item-total correlation (Pallant, 2020; Creswell and Creswell, 2022). These are referred to as internal consistency measures (Ramu et al., 2023). The recommended scores for internal consistency as found in the literature are as follows. Cronbach's alpha is expected to be greater than 0.6 (range of Cronbach's alpha is 0-1). Inter-item correlation is expected to be greater than 0.3. Item-total correlation is expected to be greater than 0.5 (Robinson et al., 1991; Hair et al., 2019). These values were set as the reference values for this research. Any item, or pair items, causing concern with regard to these values were deleted to improve the reliability of the measurement in line with recommended practice (Pallant, 2020).

4.5.8. Validity

Validity is a test that explains the extent to which the collected data truly represents a particular event under study. Cohen et al. (2018) argue that validity is the key to substantive research, and that any research that is not valid is essentially worthless. Validity concerns may arise due to problems that could exist as related to the true meanings of the responses collected through a survey, and the self-reporting of behaviour for

participants in the research (Ticehurst and Veal, 2000). Four types of validity are normally measured in quantitative research. These include content validity, criterion or convergent validity, discriminant validity, and construct validity. Each one of these is briefly described in the following sections.

4.5.9. Content Validity

Content validity is used to check whether the contents provide adequate coverage of the questions being investigated (Saunders et al., 2023). To check this, the researcher adopted the recommendation of Saunders et al. (2023) which states that the literature review could be used to carefully define the research. This was conducted through a thorough and critical review of the literature, as provided in chapters two and three of this thesis. With regard to internal consistency, this is defined as the level to which items used to measure a construct are measuring the concept(s) they are expected to. This represents a measure of reliability for the instrument, which includes the items, the scale, and the data collected using the instrument. One of the common methods used to measure internal consistency is the Cronbach's alpha (Pallant, 2020).

4.5.10. Convergent Validity

Convergent validity is also referred to as criterion validity (Zikmund et al., 2013). It is synonymous with correlational analysis and measures the level of the correlation between the items that measure a construct. It is measured by item-item correlation and item-total correlation (Holton et al., 2007). This implies that reliability measures could also be used to measure the convergent validity of an instrument (Hair et al., 2019). The recommended level of correlation is accepted as being greater than 0.3 for inter-item measurement, and greater than 0.5 for item-total measurement (Cohen, 1988; Robinson et al., 1991). Cohen (1988) further classifies inter-item correlation as small (correlation 0.10 and 0.29), medium (correlation 0.3-0.49) and large (correlation 0.50 and 1.00). These values have been used in this research as acceptable values.

4.5.11. Discriminant Validity

Holmes-Smith et al. (2006) explain that discriminant validity provides a measure of the extent to which constructs in a model may differ from one another. This is measured using structural equation modelling (SEM) (Gerbing and Anderson, 1988) and sample correlations. As far as structural equation modelling is concerned, it is explained later in this chapter. Sample correlations or correlations between any two items measuring a construct are not expected to exceed 0.8 or 0.9 (Holmes-Smith et al., 2006). This was initially checked at the pilot test level, and then tested again using SEM.

4.5.12. Construct Validity

Construct validity is concerned with the variables used in the theoretical model. It is important to measure construct validity in order to check whether the research adds substantial value to the theoretical bases on which the constructs are grounded in the respective discipline (Johari et al., 2011). For instance, in this research, the constructs are grounded on a number of relevant theories as explained in section 4.5 under type of study, and at the end of section 4.5.1.1. Cooper and Schindler (1998) argue that construct validity can be established using convergent and discriminant validity. However, Johari et al. (2011) suggest the use of exploratory and confirmatory factor analysis to establish construct validity. These are explained in Chapter 5 under the relevant section.

The number of participants in the pilot survey was 36. All the participants were students that were selected using a convenience sampling method. It is important to note that there is no consensus as to the number of sample subjects that could be considered as adequate. Different researchers have argued that different sample sizes are needed at the pilot test level. For instance, Zikmund (2003) recommends 25 subjects, Czaja (1998) suggests 20-70 subjects, Sudman (1983) advises 20-50 subjects, whereas Sheatsley (1983) identifies 12-25 subjects as being enough. Thus, a sample size of 36 can be justified as being sufficient at the pilot stage. These subjects were chosen from the same population of students under study and is in line with the recommendation of Pallant (2020). The instrument used at the pilot stage is provided in Appendix VII.

The results of the pilot test are provided in Appendix VII. The research instrument was posted on the website using the facilities provided by Survey Monkey, for the participants to provide their responses. The sample link used was http://www.surveymonkey.com/r/VTFM5DK. Using websites has become a common practice in empirical research (Clark et al., 2021). The data collected through the pilot test was analysed using SPSS (Statistical Package for Social Sciences) version 21. SPSS is a widely used software in statistical analysis in empirical research (George and Mallery, 2016). From the results, it is evidenced that reliability was established by measuring Cronbach's alpha and the internal consistency measures. It was shown that there were concerns with regard to certain pairs of items in a few constructs. Accordingly, items causing concern were deleted, and the resulting values showed that the reliability measures set for this research were achieved. The final set of items measuring each construct arrived at, based on the pilot test results, are provided in table 4.11.

#	Construct	Code	Items	Cronbach's alpha (≥0.7)	Inter-item correlation (≥0.3)		Item to total correlation (≥0.5)	
					Min	Max	Min	Max
1.	Co-production	COPR	K1-K4; E1-E4; I1-I4	0.912	0.205	0.688	0.535	0.780
2.	Value-in-use	VIU	X1-X3; P1-P4; R1-R4	0.81	0.169	0.5	0.474	0.606
3.	Student Benefits	SB	B1-B4	0.774	0.235	0.649	0.472	0.736
4.	Personal Dimension	PD	ICB01-ICB12	0.833	0.229	0.606	0.483	0.672
5.	Interpersonal Dimension	ID	ICB13-ICB20	0.831	0.265	0.669	0.467	0.752
6.	Networking Dimension	ND	ICB21-ICB25	0.782	0.342	0.649	0.541	0.659
7.	Individual Innovation Behaviour	IIB	IIB1-IIB6	0.732	0.349	0.571	0.486	0.63

Table 4.11: Final results of the reliability tests after pilot test (refer to Appendix VII for more details)

With regard to the validity test, content validity was found to be acceptable, as the items used in the research and the constructs measured using those items were found to have already been used by other researchers in the field of value co-creation concerning organisations. This was ascertained through the literature review. At the pre-test level, experts were already consulted. No revision was found necessary in relation to the formatting and language used in the instrument. Convergent validity, at the pilot level stage, was found to have a few concerns, for instance, with regard to items measuring value-in-use, as some inter-item correlations were found to be lower than 0.3. However, those items were not deleted considering the fact that Cronbach's alpha was high. In fact, researchers classify Cronbach's alpha as poor (alpha<0.6), acceptable (alpha > 0.7) and good (alpha > 0.8) (Bougie and Sekaran, 2021). Additionally, correlation is a quantity that depends on sample size, hence, at the pilot level the items causing lower than acceptable correlation were still retained. The complete explanation has been provided in Appendix VII as to why the items have been retained, despite the correlation measures being lower than the acceptable levels. Furthermore, table 4.11 shows the names of the constructs used in figure 3.1, as well as the coding used to represent them, and the items used to measure them. Discriminant validity at this stage is considered to be established, as none of the correlation measures exceeded 0.8. The results of the pilot survey paved the way for the main survey. The research instrument that was used in the main survey is provided in Appendix VI.

4.5.13. Main Survey

The main survey was conducted during the month of September 2022 using the revised instrument provided in Appendix VI. The revised instrument was published on Survey Monkey, and the link was disseminated by e-mail and SMS to all the students with the support of the authorities in the University. The main survey involved the study of over 900 students in a private university in Bahrain. The students were studying in various disciplines at the undergraduate bachelor degree level, distributed across four different colleges, namely, the college of arts and science, college of business and finance, college of engineering, and the college of information technology. The sample consists of all undergraduate students that were currently enrolled across eleven different bachelor degree programmes, thus comprising 100% participation of the students. The total number of responses received were 512, representing a response rate of 56%. The total number of valid responses were 425. When broken down by gender, the valid responses comprised 48% male and 52% female. This closely resembled the undergraduate student population's gender split at 473 students (52%) male, and 437 students (48%) female. Additionally, 54% of the valid responses identified as fully interested in innovation, whereas 40% and 7% identified as partially interested or not interested in innovation respectively. Responses were obtained from students studying on all 11 undergraduate programmes, with the highest being for the bachelor's degree in accounting and finance, at 74 responses, and the lowest being for the bachelor degree in economics and finance, at 9 responses.

4.5.14. Quantitative Data Analysis

The collected data was analysed using SPSS and SEM. The data analysis involved analysing the demographic factors, reliability test, validity tests, confirmatory factor analysis, and path analysis, which is in line with the practices commonly used in empirical research in various disciplines including those researching in the field of value co-creation. All the details and quantities that have been used in the data analysis including their definition, purpose, limits and acceptability are provided in Appendix VII due to paucity of space. The detailed analysis concerning quantitative data is provided in chapter 5.

4.5.15. Qualitative Data Collection Phase

As previously mentioned in this chapter, the qualitative research method was used in this study to support the findings of the quantitative research method. The previous chapter, discussing the theoretical framework, clearly identified the concepts concerning value co-creation, co-production, value-in-use, individual innovation behaviour, student benefits, and innovation competence and their interrelationship. The literature review chapter demonstrated that there are numerous research publications that have attempted to address the linkage between co-production of value in a classroom setting in a higher education environment. The rationale and justification for supporting the quantitative data analysis findings by the

results of the qualitative research method are provided at the end of section 4.5.1.1 which is based on the research questions and literature review provided in chapter 2. Accordingly, this section focuses on the steps involved in conducting the qualitative study.

This research relies upon the procedure recommended by Bryman (2014) which is largely consistent with the steps followed by other researchers such as Malik et al. (2022) and Pathak et al. (2022). The step involved in the procedure are:

Step	Criterion
1.	Identification of the subjects to be studied and why.
2.	The way respondents are to be recruited for the study. Could include some of the socio-demographic features of each sample member. Example of features could be age, the level of education, the level of qualification, current position, and gender.
3.	The approach to conduct the semi-structured interview.
4.	The decision on the number of people to be interviewed and the context in which the interviews need to take place.
5.	The method of analysing the interview transcripts (thematic analysis).

Table 4.12: Steps involved in conducting the qualitative research method

Each one of these steps have been discussed in detail in chapter 6 along with the analysis.

4.6. Ethical Considerations

The ethical approval for conducting this research was received from the research ethics committee at Brunel University London. The relevant forms were downloaded and submitted to the research ethics committee to obtain the ethical approval required. A number of measures were taken to ensure that the privacy and confidentiality of the information related to the participants. This included that full information is given to the participants to create awareness as to the purpose of the study, the methods used, and the rights of participants with regard to their privacy, confidentiality, and right to withdrawal from the research. These aspects were reflected in a participant information sheet and a model consent form. The contact details of the researcher were provided to enable any participant to contact the researcher, or his supervisor, should there be a need related to the research. The participants were made aware of the fact that participation in the research is voluntary. Participants were also informed of their right to forgo participation or forgo answering any questions they did not want to. The names were kept anonymous. Personal identification information was not solicited, or allowed, to be provided in any part of the research. A password protected access to the database containing raw data is withheld by the researcher.

4.7. Chapter Conclusion

This chapter provided the complete research methodology adopted in this research, beginning with the philosophical stance adopted by the researchers, to the strategy adopted to collected quantitative and qualitative data. This chapter provides the basis for analysing the collected data in subsequent chapters.

Chapter 5 – Quantitative Data Analysis

5.1. Chapter Introduction

This research investigates the influence of co-production as a determinant of value co-creation in the classroom. This chapter analyses the data collected from students as the beneficiaries of value co-creation in the classroom setting. The chapter is broadly divided into three parts, namely, descriptive statistics, confirmatory factor analysis, and path analysis. Confirmatory factor analysis and path analysis are discussed as part of the structural equation modelling (SEM) method.

5.2. Data Editing, Coding and Preparation

Following the data collection, the coding of variables was required for storing in SPSS software version 21. The data was carefully scrutinised, and edited, by checking and adjusting for legibility, consistency, omissions, and errors, to ensure the completeness of the data file. SPSS provides the frequency distribution report which was used to check the above. Data coding was achieved using character symbols and fed into SPSS. As part of the data preparation and management, the data was checked for missing values, outliers, normality, and multicollinearity (Hair et al., 2019; Pallant, 2020). Missing values were found using the frequency tables generated by SPSS. Normality was tested using the skewness and kurtosis measurement. Outliers were detected using Mahalanobis distance. The outliers were found to be negligible. Multicollinearity was checked using correlations between observed variables. These tests are described in the following section.

5.3. Demographic Data Analysis

The data analysed pertained to 425 respondents. A total of 512 responses were received from a total student population which stood at a little greater than 900 who were studying in a private university in the Kingdom of Bahrain. A census method was adopted. Hence, all the eligible students were requested to participate in the research with the support of the management in the private university. The 512 responses obtained indicated a response of rate of around 56%.

Given the main focus of this research, with the investigation directed at gaining knowledge and understanding of how innovation behaviour and student benefits can be developed in the classroom, a study of a student population in a university was deemed apt. This included students enrolled on different programmes across four colleges. This provided the basis for conducting research that is in line with the research conducted by other researchers. For instance, Leem (2021) studied 360 students in Korea in his study on the topic of value co-creation. Similarly, Dean et al. (2016) investigated value co-creation in

relation to students in a business school. The business school forms part of a wider institution whose student population numbers approximately 2,000 students. However, the authors only analysed 313 valid responses. These examples illustrate that the sample size, the response rate, and the context of study pertaining to this research are in line with the current practices, and in line with other researchers investigating value co-creation in an educational environment. The statistical analysis was performed using SPSS version 21. Each one of the demographic factors is analysed in the following section.

5.3.1. Gender
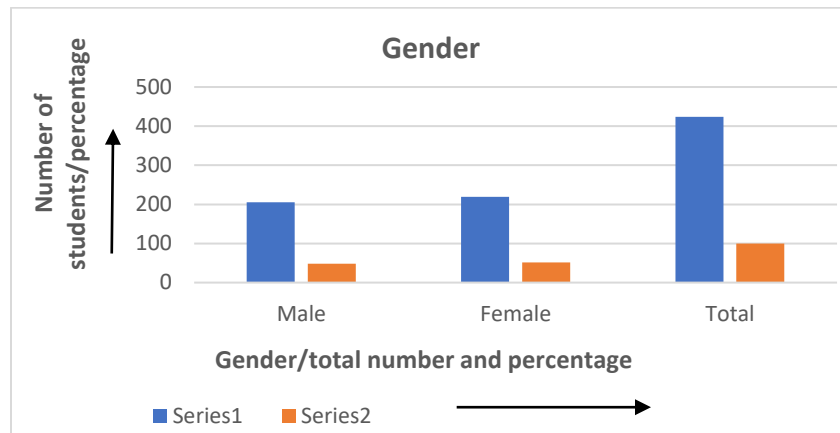
Figure 5.1: Gender chart

Figure 5.1 illustrates that female students have participated in slightly greater numbers than their male counterparts, although the gap in the percentage is marginal. Accordingly, there is no observed gender-related significance at this stage.

5.3.2. Level of Interest in Innovation

A question was asked to gauge the level of interest students could have in relation to innovation. This information could be significant in order to understand whether innovation behaviour could be fostered and developed in students in a classroom setting. If the level of interest is found to be high, it would be reasonable to assume that students could be co-producers of innovation behaviour themselves. Whereas if level of interest in innovation is found to be low, then it could be reasonable to assume that students may lack the ability and intention to adequately co-produce. Finally, if there are students that are found to have only partial interest, this could be due to those students having limited potential as co-producers of innovation behaviour.
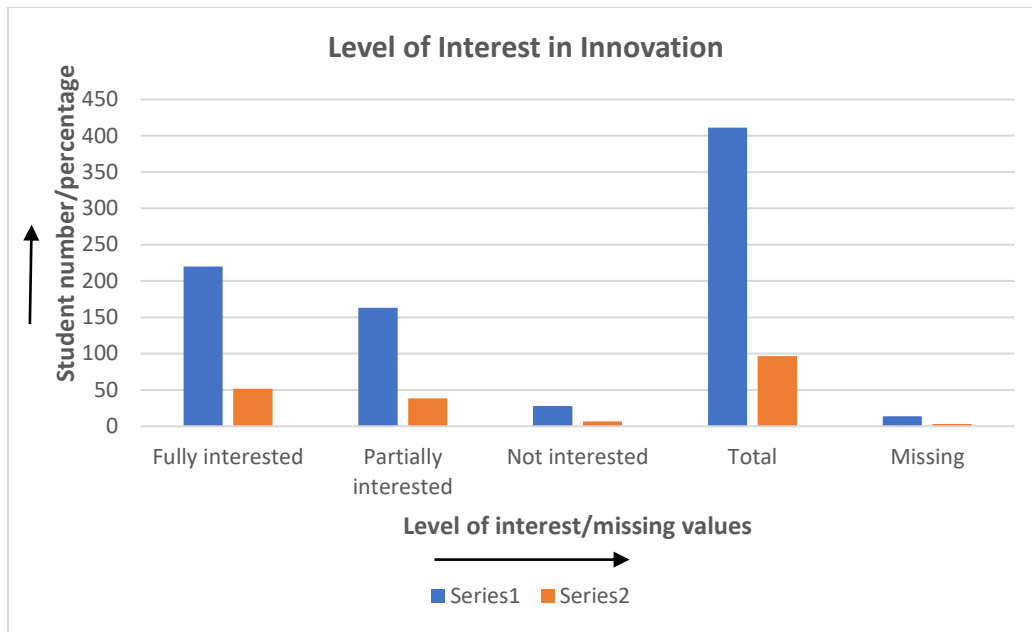
Figure 5.2: Level of interest of students in innovation

Figure 5.2 shows the percentage of students who expressed full interest in innovation is higher than that for students who expressed only partial interest in innovation, or no interest in innovation at all. The descriptive statistics presented in table 5.1 provide a detailed illustration.

		Frequency	Percent	Valid Percent	Cumulative Percent
Level of Interest in Innovation					
Valid	Fully interested	220	51.8	53.5	53.5
	Partially interested	163	38.4	39.7	93.2
	Not interested	28	6.6	6.8	100.0
	Total	411	96.7	100.0	
Missing	Missing	14	3.3		
Total		425	100.0		

Table 5.1: Descriptive statistics of level of interest of students in innovation

Table 5.1 provides a clear illustration that 51.8% of students are fully interested in innovation. This suggests that classrooms should be important locations where co-production of innovation behaviour could occur. Furthermore, 38.4% of students have expressed partial interest in innovation, which indicates that these are students whom the professors should provide some extra attention to allow for an exploration of their potential as innovators. Finally, 6.6% expressed no interest in innovation, which shows these students could pose a challenge for professors that focus on fostering innovation behaviour.

5.3.3. Programme Distribution

Figure 5.3 provides a graphical representation of the number of students enrolled in each of the 11 programmes.
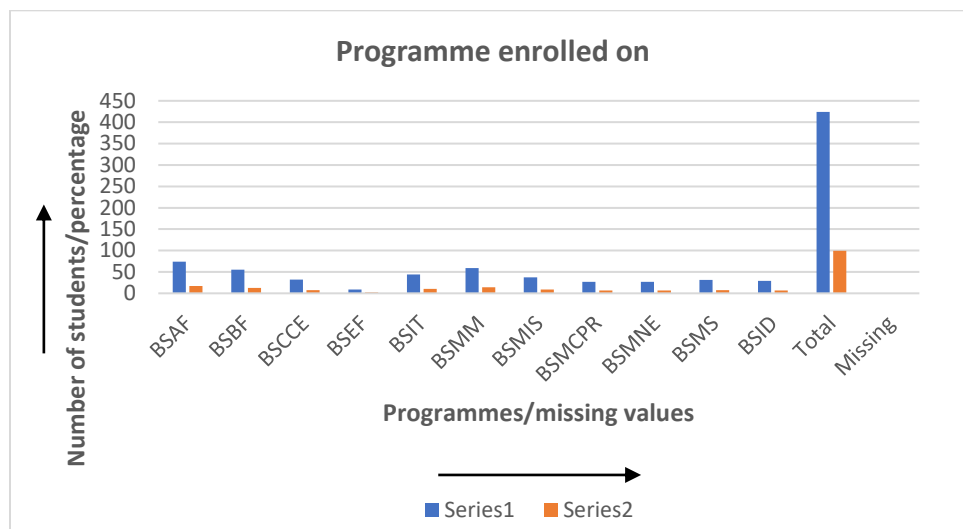
Figure 5.3: Number of students enrolled in different programmes

The descriptive statistics provided in table 5.2 clearly show that the maximum number of students enrolled are in the programme BSAF (Bachelor of Science in Accounting and Finance). This is followed by students enrolled in the BSMM (Bachelor of Science in Management and Marketing). The lowest number of students enrolled are in the programme BSEF (Bachelor of Science in Economics and Finance).

Programme					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	BSAF	74	17.4	17.5	17.5
	BSBF	55	12.9	13.0	30.4
	BSCCE	32	7.5	7.5	38.0
	BSEF	9	2.1	2.1	40.1
	BSIT	44	10.4	10.4	50.5
	BSMM	59	13.9	13.9	64.4
	BSMIS	37	8.7	8.7	73.1
	BSMCPR	27	6.4	6.4	79.5
	BSMNE	27	6.4	6.4	85.8
	BSMS	31	7.3	7.3	93.2
	BSID	29	6.8	6.8	100.0
	Total	424	99.8	100.0	
Missing	Missing	1	.2		
Total		425	100.0		

Table 5.2: Programmes in which students are enrolled

The participants are distributed across programmes. This suggests that any and every participant can be part of the innovation process to learn how to innovate in a classroom. Table 5.2 provides the descriptive statistics pertaining to the number of students enrolled in various programmes.

5.4. Descriptive Statistics of Constructs

The initial data analysis included checking the statistical aspects concerning minimum, maximum, mean, standard deviation, skewness, and kurtosis using SPSS. These are tabulated in table 5.3.

Constructs	Items	Mean		Std. Deviation (±1.5)		Skewness (±2)		Kurtosis (±3)	
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Co-production	K1-K4; E1-E4; I1-I4	3.99	4.24	0.961	1.104	-1.09	-0.865	0.493	2.39
Value-in-use	X2-X3; P2-P3; R2-R4	3.93	4.24	0.983	1.11	-1.036	-0.854	0.338	2.086
Student benefits	B1-B4	3.98	4.18	1.00	1.09	-1.358	-0.915	0.596	1.49
Personal dimension	ICB03-ICB06; ICB08-ICB09; ICB11-ICB12	3.95	4.29	0.95	1.09	-1.608	-0.87	0.631	2.645
Interpersonal dimension	ICB13-ICB17; ICB19	4.05	4.26	0.905	1.081	0.905	1.08	-1.37	-0.863
Networking dimension	ICB22-ICB25	3.93	4.204	0.98	1.04	-1.262	1.04	0.509	1.152
Individual innovation behaviour	IIB2-IIB4	4.005	4.23	0.922	0.974	-1.511	-0.995	0.942	2.62

Table 5.3: Descriptive statistics of constructs

Table 5.3 provides the descriptive statistics related to the various constructs used in the model in figure 3.1. In this research, acceptable levels of standard deviation, skewness, and kurtosis are fixed at ±2, ± 1.5 and ± 3 respectively. These limits have been fixed based on the literature. For instance, Judge and Miller (1991) recommended an acceptable standard deviation for a Likert scale instrument could be ±2 around the mean. Similarly, with regard to skewness and kurtosis in this research, the recommendations of Lei and Lomax (2005) were adopted, with the acceptable skewness level being ±2, and the acceptable kurtosis level being ±3. All readings in table 5.3 were found to be within those acceptable limits set above. This indicates that the data is normal; an essential condition that must be met to conduct further tests (Janssens et al., 2008). Normality is measured using skewness and kurtosis in empirical research (Niyungeko, 2022).

5.5. Preliminary Reliability and Validity Measurement

The preliminary reliability and validity measures were tested as per the limits fixed in chapter 4. The SPSS report pertaining to Cronbach's alpha, inter-item correlation, and item-total correlation, are tabulated in table 5.4.

5.5.1. Before Deletion of Items

#	Construct	Code	Items	Cronbach's alpha (≥0.7)	Inter-item correlation (≥0.3)		Item to total correlation (≥0.5)		Remarks
					Min	Max	Min	Max	
1.	Co-production	COPR	K1-K4; E1-E4; I1-I4	0.865	0.119	0.494	0.432	0.701	Some of the inter-item correlation (K1-E1; K1-E2; K1-E3; K2-E1; K2-E2; K2-E3; K2-E4; K3-E1; K3-E2; K3-E3; K3-E4; K4-E1; K4-E2; I1-E1; I1-E2; I1-E3; I1-E4; I2-E1; I2-E2; I2-E4; I3-E1; I3-E2; I3-E3; I3-E4; K2-K3) values were found to be below the acceptable value of 0.3. At this stage items E1,E2, E3 and E4 were found to cause concern.
2.	Value-in-use	VIU	X2-X3; P2-P3; R2-R4	0.803	0.24	0.478	0.438	0.652	Items causing concern were P2 and P3. The pair of items causing concern were (P2-X2, P2-R2, P3-X3, P3-R3).
3.	Student benefits	SB	B1-B4	0.738	0.387	0.459	0.479	0.559	All items were retained although B3 was causing concern with an item to total correlation of 0.479 which is less than the acceptable 0.5. However, based on cronbach's alpha value and inter item correlation values all items were retained.
4.	Personal dimension	PD	ICB03-ICB06; ICB08-ICB09; ICB11-ICB12	0.831	0.21	0.585	0.459	0.668	ICB05 is found to cause concern. Pairs of items causing concern are ICB05-ICB06, ICB05-ICB08, ICB05-ICB09, ICB06-ICB09, ICB08-ICB11 and contributed to lower item to item correlation. Further ICB05, ICB08 and ICB09 contributed to lower item to total correlation (<0.5).
5.	Interpersonal dimension	ID	ICB13-ICB17; ICB19	0.762	0.281	0.404	0.47	0.547	ICB14-ICB15and ICB14-ICB16 were pairs causing concern with regard to items item to item correlation which were less than 0.3. As for the item to total correlation, ICB14, ICB15 and ICB16 were causing concern as the correlation was less than 0.5. ICB15 was causing concern with regard to item to total correlation (0.47).
6.	Networking dimension	ND	ICB22-ICB25	0.706	0.245	0.436	0.45	0.531	ICB23-ICB24 relationship was causing concern with regard to item-to-item correlation which was less than 0.3. ICB23 and ICB24 were also causing concern with regard to item to total correlation as the correlation was less than 0.5. ICB23 was identified as causing concern as item to total correlation was the lowest at 0.45.
7.	Individual innovation behaviour	IIB	IIB2-IIB4	0.702	0.354	0.5	0.476	0.588	Item to total correlation with regard to IIB2 and IIB4 were lower than 0.5. All item-to-item correlation values found satisfactory.

Table 5.4: Reliability and internal consistency measurement

5.5.2. After Deletion of Items

#	Construct	Code	Items	Cronbach's alpha (≥0.7)	Inter-item correlation (≥0.3)		Item to total correlation (≥0.5)		Remarks
					Min	Max	Min	Max	
1.	Co-production	COPR	K1-K4; I1-I4	0.855	0.253	0.48	0.548	0.645	Items E1,E2, E3 and E4 were found to cause concern and were deleted. Although correlation between K2-K3 was less than 0.3 it was retained considering the fact that all item-total correlation values were found to be >0.5. It was kept under observation.
2.	Value-in-use	VIU	X2-X3; R2-R4	0.783	0.358	0.478	0.536	0.611	Items causing concern were P2 and P3 and were deleted. All correlation values were found to be within acceptable values.
3.	Student benefits	SB	B1-B4	0.738	0.387	0.459	0.479	0.559	All items were retained although B3 was causing concern with an item to total correlation of 0.479 which is less than the acceptable 0.5. However, based on cronbach's alpha value and inter item correlation values all items were retained.
4.	Personal dimension	PD	ICB03-ICB04; ICB06; ICB08-ICB09; ICB11-ICB12	0.824	0.249	0.585	0.464	0.662	ICB05 is found to cause concern with its item to total correlation value found to be the lowest (0.459) and hence was deleted. However still some pairs of items were causing concern namely ICB06-ICB08, ICB09-ICB11 contributed to lower item to item correlation (<0.3). However, the correlation between ICB09 and ICB11 was found to be very close to 0.3 at 0.297 and hence were retained. However, items ICB06 and ICB08 were still retained as item to total correlation was found to be >0.5. Again, item to total correlation of ICB09 was found to be 0.464 which is less than 0.5 yet it was retained based on the item-to-item correlation and Cronbach's alpha measurement.
5.	Interpersonal dimension	ID	ICB13-ICB14; ICB16; ICB19	0.736	0.29	0.404	0.457	0.553	ICB15 was deleted because it was causing concern with regard to item to total correlation (0.47). However, item to item correlation of ICB14-ICB16 was causing concern with regard to items item to item correlation (0.29) which was less than 0.3. Yet both items were retained as the correlation was very close to 0.3. However, the item to total correlation was concerned ICB14, ICB16 and ICB19 were causing concern as the correlation was less than 0.5. Yet those items were retained taking into account the item-to-item correlation values and Cronbach's alpha. Those items were kept under observation.
6.	Networking dimension	ND	ICB22-ICB25	0.706	0.245	0.436	0.45	0.531	ICB23-ICB24 relationship was causing concern with regard to item-to-item correlation which was less than 0.3. ICB23 and ICB24 were also causing concern with regard to item to total correlation as the correlation was less than 0.5. ICB23 was identified as causing concern as item to total correlation was the lowest at 0.45. Yet all items were retained as removing ICB23 caused the Cronbach's alpha to reduce to less than the acceptable value of 0.7. These items were kept under observation.
7.	Individual innovation behaviour	IIB	IIB2-IIB4	0.702	0.354	0.5	0.476	0.588	Item to total correlation with regard to IIB2 and IIB4 were lower than 0.5. All item-to-item correlation values found satisfactory.

Table 5.5: Reliability and internal consistency measurement after deleting items

There were some items causing concern. Accordingly, certain items were deleted based on the internal consistency values, namely, Cronbach's alpha, item-item correlation, and item to total correlation, which were found to be lower than the accepted values. After deleting the items, the retained items are reflected in column 4 of table 5.5.2. The explanation for the items causing concern and the decisions taken in that regard is provided in the remarks column. Table 5.5 provides the report produced by SPSS after deleting the items causing concern. An explanation of the decision taken with regard to certain items still causing concern, but retained, is provided in the last column. In summary, table 5.5 demonstrates that Cronbach's alpha for all constructs were found to be greater than 0.7, indicating that the instrument and data are reliable and have the first level of internal consistency measured and found to be acceptable.

As for inter-item correlation, some correlations still pertaining to the constructs co-production, personal dimension, interpersonal dimension, and networking dimension were found to be lower than the acceptable level of 0.3. Those items were still retained and checked for the item-to-total correlation. Even the item-to-total correlation was found to be lower than the acceptable level of 0.5 with regard to some items in the case of the constructs personal dimension, interpersonal dimension, and networking dimension. However, with regard to the construct of co-production, the item-to-total correlation was found to be above 0.5. Therefore, a decision was taken by the researcher that all items in table 5.5, concerning the construct co-production, will be retained for further testing owing to the fact that the Cronbach's alpha and item-to-total correlation were acceptable. A similar decision was made with regard to the constructs of student benefits and individual innovation behaviour, wherein the Cronbach's alpha value and inter-item correlation value for all items were within the acceptable limits, but the item-total correlation for some items were lower than 0.5. However, all items with regard to those two constructs, mentioned in table 5.5, were retained for further tests. As for the other three constructs, namely, personal, interpersonal, and networking dimensions, the items mentioned in table 5.4 were retained based on the criterion that Cronbach's alpha met the requirements, which indicates that internal consistency was achieved. Although there were some items causing concern with regard to inter-item correlation and item-total correlation in measuring those three constructs, however, in considering the value of the items to the measurement of those constructs, those items were retained and kept under observation to see their performance under further tests before deleting them from the model.

The preceding discussion establishes that convergent and content validity have been achieved. At this stage, the maximum correlation between various items measuring each one of the constructs was tested. All of them were found to be lower than the reference value set at less than 0.9. Hence, at this level, it was concluded that discriminant validity was achieved. Nevertheless, it was further tested when conducting the

structural equation modelling, which is discussed later in this chapter. Consequently, it was possible to draw the model that was ready for conducting the SEM.

5.6. Model Developed for SEM

AMOS version 18 was used to draw the model that was subjected to the SEM. AMOS is a widely used software. The final model that emerged based on table 5.5 is provided in figure 5.4 below. This model provided the basis to conduct the main survey analysis using SEM.
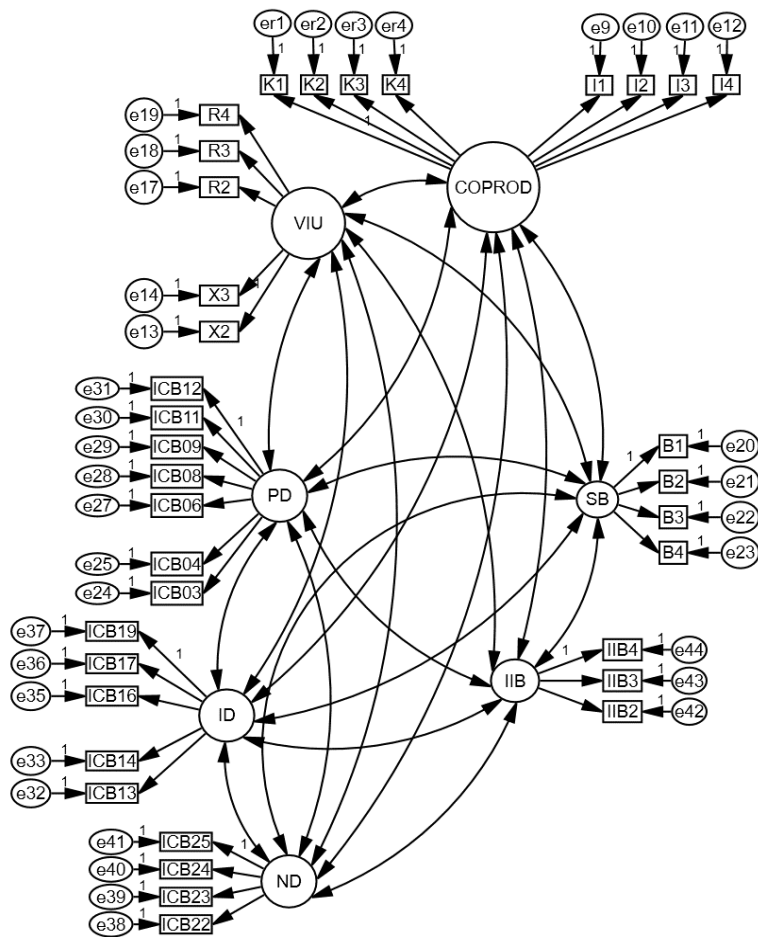
Figure 5.4: Initial model derived after testing the data for reliability and validity tests

5.7. Main Survey Analysis using SEM

The main analysis involves the use of SEM to analyse the data using the model in figure 5.4. SEM comprises two steps. The first one is the confirmatory factor analysis (CFA), and the second is the path analysis (Janssen et al., 2008). In the first step the tests involved were used to test the construct reliability, discriminant validity, sample correlation (Holmes-Smith et al., 2006), standard residual covariance (Jöreskog and Sörbom, 1984), and checking the fitness of the model to the data (Arbuckle, 2021). Path analysis involved testing the measurement model and structural model (Janssen et al., 2008). The next section provides the confirmatory factor analysis details, involving a series of steps and related discussion.

5.8. Construct Reliability of the Measurement Model

Holmes-Smith et al. (2006) explain construct reliability as follows. It provides a measure of the internal consistency of a group of measures, and not a single variable. In other words, it provides an estimate of the degree to which that group of measures determine a common latent variable. A latent variable is a variable that is not directly observable, but rather indirectly measured, using the group of measures called observed variables (Byrne, 2016). An example of a latent variable is co-production, while an example of observed variables would include the set of items measuring co-production (i.e. K1, K2, K3 and K4). Terms such as latent variable and observed variable are part of the SEM terminology. These are provided in appendix X. An important use of measurement of construct reliability is that it is based on the estimate of model parameters. This measure can be used in different tests including the confirmatory factor analysis or path model; both having latent variables. This is measured using squared multiple correlations (SMC). Acceptable values of SMC, as found in the literature, vary, but a figure of 0.3 is considered appropriate (Holmes-Smith et al., 2006). The limitations of using SMC as a measure may include that some software, such as EQS software, do not have non-linear constraints which is essential to produce SMC - which by itself is a nonlinear quantity. Furthermore, it is measure that is used in group comparison, and it is possible that this method could fail beyond two groups (Kwan and Chan, 2014). Nevertheless, this method is widely used and AMOS software has been reported to be useful by other researchers (Arbuckle, 2021).

5.9. Discriminant Validity of the Measurement Model

Discriminant validity measures the degree to which the constructs or latent variables in a conceptual model are different. When latent variables are interrelated this measure becomes important. This is measured using correlations between constructs, where a correlation exceeding 0.9 could indicate the absence of discriminant validity (Holmes-Smith et al., 2006). Discriminant validity is measured using AMOS. This is a widely used measure of discriminant validity in SEM (Bougie and Sekaran, 2019).

5.10. Standard Residual Covariance of the Measurement Model

Standard residual covariance is an important pre-cursor to another measurement called model fit. A correct model is expected to have a value not exceeding 2.58, as recommended by Jöreskog and Sörbom (1984). It is defined as the ratio of the difference between the residual covariance of two indicators to an estimate of its standard error. The residual covariance itself is the difference between the sample covariance and a model implied covariance (Jöreskog and Sörbom, 1984).

5.11. Fitness of the Measurement Model to Data

A standard practice followed by researchers is the fitting of a model to the data using specific indices during CFA, and during path analysis. This determines the extent to which a covariance model fits the sample data (Schermelleh-Engel et al., 2003). There are no well-established formulas, conditions, nor instructions that can be found in the literature as guidelines, to follow by researchers, as to the minimum requirements to be satisfied in order to consider that a model fits adequately to data. Nonetheless, researchers report model fit measurement, and evaluating the model fit is considered an important step in research (Schermelleh-Engel et al. 2003). The model fit is measured using several indices including Goodness or fit index (GFI), Comparative fit index (CFI), Chi-squared goodness of fit test (CMIN (λ2)), Tucker-Lewis index (TLI), Normed fit index (NFI), Increment fit index (IFI), Normal Chi-squared test (CMIN/df), Root mean square residual (RMR) and Root mean square error or approximation (RMSEA) (Kline, 1998; Arbuckle and Wothke, 1999; Byrne, 2001; Schreiber et al., 2006; Liu, 2022). Further to explaining the steps involved in CFA, the following section discusses the analysis involved with each one of the steps mentioned above.

5.12. Construct Reliability of the Measurement Model

As mentioned in the previous section, the squared multiple correlation (SMC) test was used to measure the construct reliability. SMC provides the degree of variance accounted for in the latent construct (e.g. Co-production; code: COPROD) with regard to the observed variables (e.g. K1, K2, K3 and K4). Acceptable values of SMC are ≥ 0.3 which is in line with the suggested values by Holmes-Smith et al. (2006). AMOS was used to generate the SMC report. Table 5.6 provides the SMC values of the initial model in figure 5.4. All SMC values were found to satisfy the minimum conditions.

Observed variables	Estimate	Observed variables	Estimate	Observed variables	Estimate
R4	.505	K4	.440	IIB2	.347
R3	.399	K3	.343	IIB3	.578
R2	.417	K2	.356	IIB4	.431
X3	.395	K1	.395	ICB25	.414
X2	.395	IIB2	.347	ICB24	.329
B4	.460	IIB3	.578	ICB23	.321
B3	.336	IIB4	.431	ICB22	.450
B2	.408	ICB03	.472	ICB19	.356
B1	.462	ICB04	.461	ICB17	.387
I4	.536	ICB06	.344	ICB16	.324
I3	.430	ICB08	.310	ICB14	.338
I2	.448	ICB09	.311	ICB13	.397
I1	.453	ICB11	.413		
		ICB12	.551		

Table 5.6: SMC measure of the initial (measurement) model

5.13. Discriminant Validity of the Measurement Model

As previously mentioned in earlier sections of this chapter, discriminant validity was measured using sample correlations, which were generated by AMOS. Each one of these is checked. Large correlations indicate a lack of discriminant validity in the data. Correlations exceeding 0.8 or 0.9 could indicate deficiency in discriminant validity (Holmes-Smith et al., 2006). Table 5.7 provides the correlation amongst the observed variables. All of the sample correlation values were found to be less than 0.8. Accordingly, discriminant validity is considered achieved.

5.14. Residual Covariance and Standardised Residual Covariance

Jöreskog and Sörbom (1984) argue that covariance between any two items, or observed variables, provides knowledge about the extent to which the two variables share the variance. The AMOS report on the residual covariance is provided in table 5.8.

Sample Correlations (Group number 1)

	IIB2	IIB3	IIB4	ICB25	ICB24	ICB23	ICB22	ICB19	ICB17	ICB16	ICB14	ICB13	ICB03	ICB04	ICB06	ICB08	ICB09	ICB11	ICB12	R4	R3	R2	X3	X2	B4	B3	B2	B1	I4	I3	I2	I1	K4	K3	K2	K1
IIB2	1.0																																			
IIB3	0.5	1.0																																		
IIB4	0.4	0.5	1.0																																	
ICB25	0.2	0.3	0.3	1.0																																
ICB24	0.1	0.3	0.3	0.4	1.0																															
ICB23	0.3	0.3	0.2	0.4	0.2	1.0																														
ICB22	0.2	0.3	0.3	0.4	0.4	0.4	1.0																													
ICB19	0.3	0.4	0.3	0.3	0.3	0.3	0.3	1.0																												
ICB17	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.4	1.0																											
ICB16	0.3	0.4	0.3	0.3	0.3	0.2	0.3	0.3	0.4	1.0																										
ICB14	0.3	0.4	0.3	0.2	0.3	0.3	0.3	0.4	0.4	0.3	1.0																									
ICB13	0.3	0.4	0.3	0.3	0.3	0.3	0.4	0.3	0.4	0.3	0.4	1.0																								
ICB03	0.3	0.4	0.4	0.4	0.3	0.4	0.5	0.2	0.3	0.3	0.3	0.4	1.0																							
ICB04	0.2	0.3	0.3	0.5	0.4	0.4	0.5	0.3	0.3	0.3	0.3	0.4	0.6	1.0																						
ICB06	0.2	0.3	0.2	0.4	0.4	0.3	0.4	0.2	0.3	0.3	0.3	0.3	0.3	0.4	1.0																					
ICB08	0.2	0.2	0.3	0.4	0.3	0.3	0.3	0.3	0.2	0.3	0.2	0.3	0.4	0.4	0.3	1.0																				
ICB09	0.1	0.2	0.2	0.4	0.3	0.3	0.4	0.3	0.2	0.3	0.2	0.3	0.3	0.4	0.2	0.3	1.0																			
ICB11	0.2	0.3	0.2	0.4	0.4	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.5	0.3	0.3	1.0																		
ICB12	0.2	0.3	0.3	0.5	0.5	0.4	0.5	0.4	0.3	0.4	0.3	0.4	0.5	0.5	0.5	0.5	0.4	0.5	1.0																	
R4	0.2	0.3	0.3	0.4	0.3	0.4	0.4	0.3	0.3	0.3	0.2	0.3	0.5	0.4	0.4	0.5	0.4	0.4	0.5	1.0																
R3	0.2	0.3	0.3	0.4	0.3	0.3	0.4	0.3	0.2	0.3	0.2	0.3	0.4	0.4	0.3	0.3	0.4	0.4	0.4	0.4	1.0															
R2	0.2	0.3	0.3	0.4	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.4	0.4	0.5	0.4	1.0														
X3	0.2	0.3	0.2	0.3	0.4	0.3	0.4	0.2	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.4	1.0													
X2	0.2	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.2	0.3	0.2	0.3	0.4	0.4	0.3	0.3	0.4	0.4	0.3	0.4	0.4	0.5	0.4	1.0												
B4	0.3	0.3	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.3	1.0											
B3	0.2	0.3	0.3	0.3	0.2	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.3	0.4	1.0										
B2	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.2	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.3	0.3	0.5	0.4	1.0									
B1	0.3	0.4	0.3	0.3	0.2	0.2	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	1.0								
I4	0.3	0.4	0.3	0.4	0.3	0.4	0.4	0.3	0.3	0.3	0.2	0.3	0.4	0.5	0.4	0.4	0.4	0.5	0.5	0.5	0.4	0.5	0.5	0.4	0.4	0.3	0.4	0.4	1.0							
I3	0.2	0.3	0.2	0.4	0.4	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.3	0.4	0.4	0.5	0.4	0.5	0.4	0.4	0.3	0.3	0.3	0.3	0.5	1.0						
I2	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.2	0.3	0.3	0.3	0.4	0.3	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.5	1.0					
I1	0.4	0.4	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.4	0.3	0.5	0.4	0.5	0.5	0.5	1.0				
K4	0.2	0.3	0.3	0.3	0.3	0.3	0.4	0.2	0.3	0.3	0.2	0.3	0.4	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.5	0.4	0.5	0.5	1.0			
K3	0.2	0.2	0.2	0.3	0.3	0.2	0.3	0.2	0.1	0.2	0.1	0.2	0.3	0.3	0.3	0.2	0.3	0.3	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.1	0.2	0.2	0.5	0.4	0.4	0.4	0.4	1.0		
K2	0.2	0.3	0.3	0.2	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.3	0.3	1.0	
K1	0.2	0.3	0.3	0.3	0.2	0.3	0.4	0.3	0.3	0.2	0.2	0.3	0.4	0.4	0.4	0.3	0.3	0.3	0.4	0.4	0.3	0.4	0.4	0.4	0.2	0.3	0.2	0.3	0.5	0.4	0.4	0.4	0.4	0.3	0.5	1.0

Table 5.7: Sample correlations

All sample correlation values were found to be less than 0.8.

5.15. Standardised Residual Covariance

Kline (2011) suggests a value of ±2.58 as acceptable. Table 5.8 below provides the standardised residual covariance readings generated by AMOS.

Thus, the model is ready to be tested for fitting to the data.

Standardised residual covariance

	IIB2	IIB3	IIB4	ICB25	ICB24	ICB23	ICB22	ICB19	ICB17	ICB16	ICB14	ICB13	ICB03	ICB06	ICB08	ICB09	ICB11	ICB12	R4	R3	R2	X3	X2	B4	B3	B2	B1	I4	I3	I2	I1	K4	K2	K1
IIB2	0																																	
IIB3	0.379	0																																
IIB4	-0.627	0.008	0																															
ICB25	-1.354	-0.291	0.506	0																														
ICB24	-1.892	-0.279	0.809	1.315	0																													
ICB23	0.942	0.385	0.073	0.046	-1.576	0																												
ICB22	-1.149	0.155	1.396	-0.816	-0.221	1.158	0																											
ICB19	0.775	-0.082	0.122	0.435	0.467	0.246	-0.675	0																										
ICB17	-0.513	0.002	-0.95	-0.147	0.307	0.734	-1.46	0.527	0																									
ICB16	-0.094	-0.133	0.735	-0.423	1.441	-0.5	-0.183	-0.212	0.547	0																								
ICB14	0.099	0.097	0.686	-1.575	-0.075	0.752	0.345	0.112	0.416	-0.794	0																							
ICB13	-0.075	-0.171	-0.005	0.29	-0.232	0.505	0.663	-1.016	0.226	-0.597	0.649	0																						
ICB03	0.206	0.784	1.753	-0.153	-1.056	-0.194	0.873	-1.123	-1.207	-0.338	-0.429	1.606	0																					
ICB06	-1.158	0.248	-0.956	0.506	1.324	0.051	-0.002	-0.688	-0.11	0.093	0.298	-0.503	-0.949	0																				
ICB08	0.16	-0.985	1.244	-0.153	-0.666	0.187	-1.329	0.574	-0.854	1.082	-0.158	0.623	0.951	-0.481	0																			
ICB09	-1.555	-1.005	-0.205	0.135	-0.049	0.277	0.52	0.932	-0.599	1.01	-0.674	-0.039	-0.714	-1.534	0.672	0																		
ICB11	0.154	0.663	-0.244	0.244	0.308	-1.134	-0.911	0.421	0.613	0.411	0.277	0.797	0.079	1.482	-1.09	-0.25	0																	
ICB12	-0.837	-0.428	0.741	-0.029	0.128	0.113	0.466	0.716	-1.515	0.817	-1.274	0.373	0.116	0.712	1.023	-1.098	0.142	0																
R4	-0.486	-0.913	0.196	0.287	-0.478	1.068	0.518	-0.214	-0.758	0.858	-1.301	-0.642	0.953	0.251	1.572	0.815	-0.529	-0.256	0															
R3	-0.53	0.895	0.987	0.408	-0.538	-0.471	0.346	-0.122	-0.667	0.139	-0.223	0.068	0.122	-0.474	-0.319	0.784	-0.235	-0.381	-0.123	0														
R2	0.088	0.601	0.395	0.547	-0.004	-1.264	-0.306	0.729	-0.405	0.701	-0.124	0.287	-0.423	-0.029	-0.443	-0.003	0.605	-0.51	0.151	0.469	0													
X3	-0.145	-0.537	-0.397	-0.821	0.753	0.112	0.679	-0.281	0.339	1.163	1.088	0.561	-1.257	0.166	-1.266	-0.624	-0.171	-0.068	-0.433	0.106	-0.416	0												
X2	-1.529	0.607	0.342	-1.324	-0.884	0.164	0.248	1.319	-0.57	0.914	-1.222	-0.363	0.724	-1.192	1.857	0.214	0.095	0.195	0.54	-0.73	-0.653	1.059	0											
B4	-0.203	-0.992	0.415	1.387	0.083	0.146	0.075	0.305	0.043	-0.343	-0.294	0.554	0.919	-0.291	0.648	0.577	0.414	-0.277	0.531	0.061	-0.289	-0.344	-0.684	0										
B3	-0.332	0.144	0.993	-0.013	-0.273	-0.754	-0.266	0.448	-0.076	0.468	-0.974	-0.62	0.091	0.082	-0.896	0.613	0.097	-0.288	-0.245	-0.27	-0.369	0.306	-0.116	0										
B2	1.43	-0.498	-0.066	0.081	-0.393	-0.082	-1.463	0.664	-0.287	0.321	-1.591	0.276	-0.417	-1.484	-0.627	0.445	1.101	-0.832	-1.153	-0.756	-1.144	1.046	0.645	0.5	-0.27	0								
B1	-0.867	0.58	0.188	0.122	-0.587	-0.949	1.607	-0.597	0.268	0.492	0.8	-0.222	1.072	-0.715	-0.235	-0.858	0.523	-0.199	0.193	0.254	0.259	0.531	1.495	-0.209	0.025	0.005	0							
I4	-0.136	0.411	-0.057	1.093	-0.892	0.393	-0.806	-0.391	0.407	0.072	-1.273	0.671	0.442	0.044	0.751	0.716	1.243	0.514	0.499	-0.223	0.557	0.597	-0.153	0.17	0.293	0.853	-0.137	0						
I3	-0.921	0.324	-0.719	0.684	0.938	0.522	0.199	0.121	0.597	0.683	0.616	0.061	0.277	-0.071	-0.236	0.227	1.04	-1.164	0.444	0.717	1.244	-0.243	-0.231	0.45	-0.439	-0.929	-0.041	0.023	0					
I2	0.001	-0.112	-0.737	-0.806	0.337	0.153	0.123	-0.032	-0.584	-0.265	0.474	0.74	-0.815	-0.733	0.797	-0.754	0.127	-0.292	-1.338	0.365	0.989	0.16	-0.76	-0.405	1.065	-0.835	-0.509	-0.71	0.393	0				
I1	1.907	0.224	0.786	-0.335	-0.796	-0.164	0.639	0.565	-1.654	0.355	-1.174	-1.204	-0.807	-0.586	-0.514	0.661	0.435	0.118	-0.86	0.439	-0.698	0.481	-0.015	0.211	0.825	1.412	-0.102	-0.655	-1.07	0.672	0			
K4	-0.33	-0.787	1.187	-0.064	-0.111	0.057	0.609	-1.24	-0.362	0.076	-0.874	1.053	0.778	-0.261	0.527	0.435	0.258	-0.175	0.282	0.817	-0.497	-0.163	-0.626	0.186	0.137	-0.819	-0.758	0.047	-0.442	0.42	1.028	0		
K2	-1.003	0.061	0.858	-1.752	-0.443	0.975	-0.33	-0.759	-0.156	1.318	1.258	0.382	-0.184	-0.971	-0.381	-0.484	0.013	-1.051	-1.139	-0.332	0.335	0.667	-0.526	0.549	0.465	0.09	0.216	-0.459	0.424	0.52	0.392	-0.988	0	
K1	-0.434	-0.676	-0.124	-0.069	-1.246	0.278	0.642	0.272	0.488	-0.02	1.368	0.562	-1.201	0.322	0.17	-0.148	-0.28	-0.663	-0.384	0.016	0.323	0.231	-1.241	0.233	-0.973	0.31	0.048	-0.03	0.263	-0.26	-0.347		1.617	0

Table 5.8: Standardised residual covariance after deleting K3
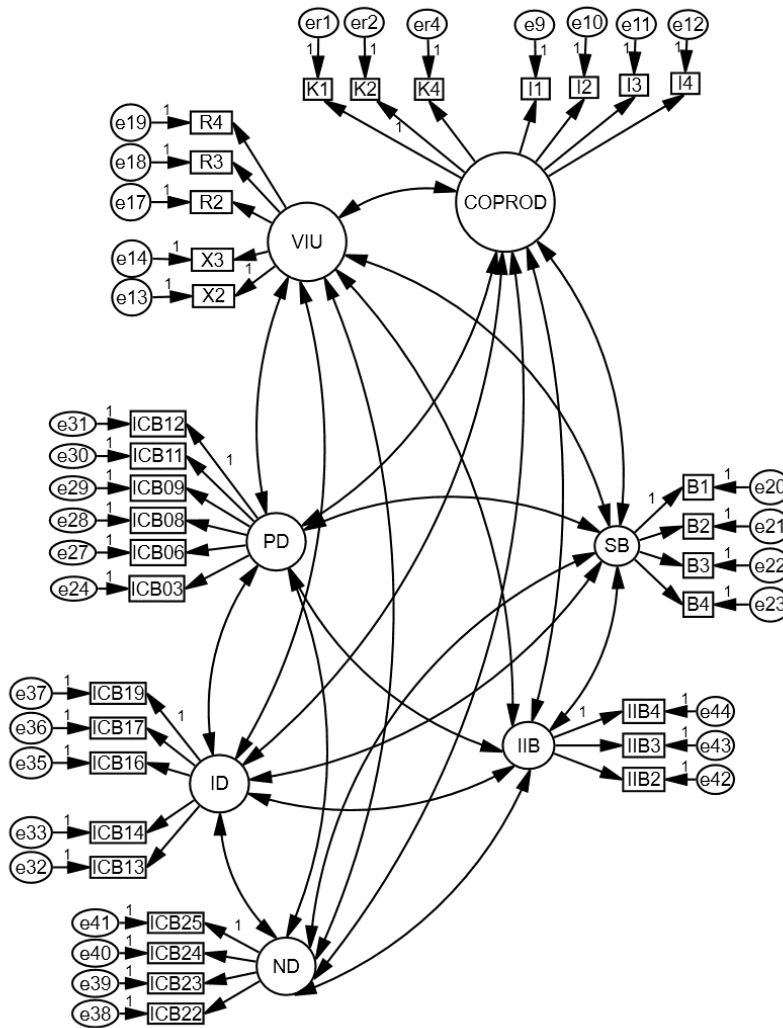
Figure 5.5: Resultant model

5.16. Correlation between Latent Variables

As previously stated, correlation between latent variables exceeding 0.8 or 0.9 is considered to be deficient in discriminant validity (table 5.9). Correlation between three pairs of variables, specifically (COPROD <--> VIU), (PD <--> ND) and (VIU <--> PD), exceeded 0.9 and were creating concern. However, the three pairs were still retained to observe how the pairs function during other tests before deleting the relationship between those variables.

Correlations: (Group number 1 - Default model)

			Estimate
ID	<-->	ND	.809
COPROD	<-->	VIU	.927
COPROD	<-->	PD	.869
COPROD	<-->	SB	.728
SB	<-->	IIB	.760
ND	<-->	IIB	.617
COPROD	<-->	ND	.819
ID	<-->	IIB	.822
SB	<-->	ID	.740
COPROD	<-->	ID	.688

			Estimate
PD	<-->	ND	1.042
PD	<-->	IIB	.623
SB	<-->	PD	.716
PD	<-->	ID	.764
SB	<-->	VIU	.694
VIU	<-->	IIB	.608
VIU	<-->	ND	.873
VIU	<-->	ID	.697
VIU	<-->	PD	.936
COPROD	<-->	IIB	.665
SB	<-->	ND	.685

Table 5.9: Correlations amongst latent variables

5.17. Fitness Test

Fitting the data to the model is an important test that determines the measurement model that will used to conduct the path analysis. AMOS produces several indices, for example GFI, IFI, TLI, CFI, RMR and RMSEA. These are widely used indices in research and the acceptable values are provided in table 5.10.

Fitness test statistics	Abbreviation	Acceptable value	Meaning
Goodness or fit index	GFI	0.9 < GFI <1	Good fit to the justified model
Comparative fit index	CFI	0.9 <CFI <1.0	Percent improvement over null model
Chi-squared goodness of fit test	CMIN (λ^2)	Chi-squared = n.s.	Good fit to the justified model
Tucker-Lewis index	TLI	0.9 <TLI <1.0	Percent improvement over null model
Normed fit index	NFI	0.9 <NFI <1.0	Percent improvement over null model
Increment fit index	IFI	0.9 <IFI <1.0	Percent improvement over null model
Normal Chi-squared test	CMIN/df	(Chi-squad/df) ≤ 3	Good fit to the justified model
Root mean square residual	RMR	Smaller the better	0 indicates perfect fit
Root mean square error or approximation	RMSEA	0 < RMSEA <0.08	Good model fit

Table 5.10: Widely used fitness indices (Source: Kline, 1999; Arbuckle and Wothke, 1999; Byrne, 2001; Schreiber et al., 2006; Liu, 2022)

Table 5.11 below provides the fitness indices generated by AMOS.

Indices	Readings
GFI	0.912
IFI	0.964
RFI	0.868

TLI	0.959
CFI	0.963
RMR	0.034
RMSEA	0.03

Table 5.11: Fitness indices

The results from table 5.11 show that all fitness indices, except RFI, meet the specifications defined in table 5.10 above. From the discussions above, it is shown that figure 5.2 provides the basis to draw the measurement model, which is to be used to conduct the path analysis. This is discussed in the next section.

5.18. Path Analysis

5.18.1. Model Analysis

This step involves an estimation procedure for which the issue of whether the model fits the data or not is tested. The Maximum Likelihood (ML) procedure was used (Kline, 1998). The ML procedure is used because it provides the model fit regardless of whether there are missing data items, or data is complete, or whether the data is normally distributed or not (Little and Rubin, 1987). AMOS uses the ML procedure in the model estimation step. The model analysis is also referred to as model estimation. In this step the hypotheses are tested.

The initial measurement model is provided in figure 5.6, found below.
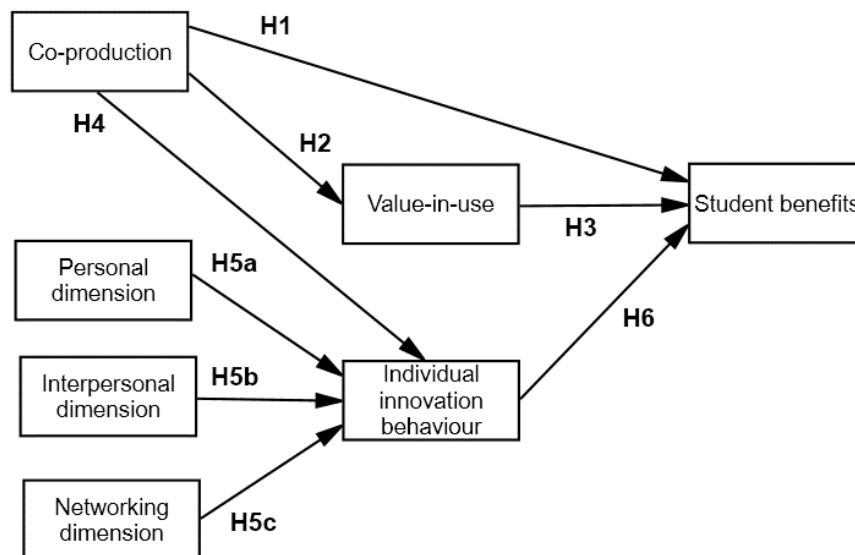
Figure 5.6: Initial measurement model

The model comprises seven latent variables. Out of these four are exogenous (Co-production, Personal dimension, Interpersonal dimension and Networking dimension) while three are endogenous variables (Value-in-use, Individual innovation behaviour, and Student benefits). The model analysis by AMOS provides standardised output, which is the regression-beta output. Regression output is classified under three categories, namely 0.1, 0.3, and 0.5 by Kline (1998) who argues that 0.1 indicates small effect of the determinant on the determined; 0.3 indicates a medium effect; and 0.5 indicates a large effect. The next step involves the SMC of the measurement model (initial structural model). This was tested, in line with the arguments provided in section 5.8. As in the case of the CFA, and as explained in section 5.8, with regard to path analysis, the construct reliability had to be checked using SMC. This is discussed in the following section.

5.18.2. SMC of the Initial Structural Model Subjected to Path Analysis

The structural model, which represents the theoretical model given in figure 5.6, is provided in figure 5.7. This is called the initial structural model, as the final model could be a modified version of this initial structural model. Figure 5.8 provides the parameters measured by AMOS directly on the model and is the standardised version of the model produced by AMOS. Table 5.12 illustrates that all SMC values are above 0.3, which was the reference level set for this research.
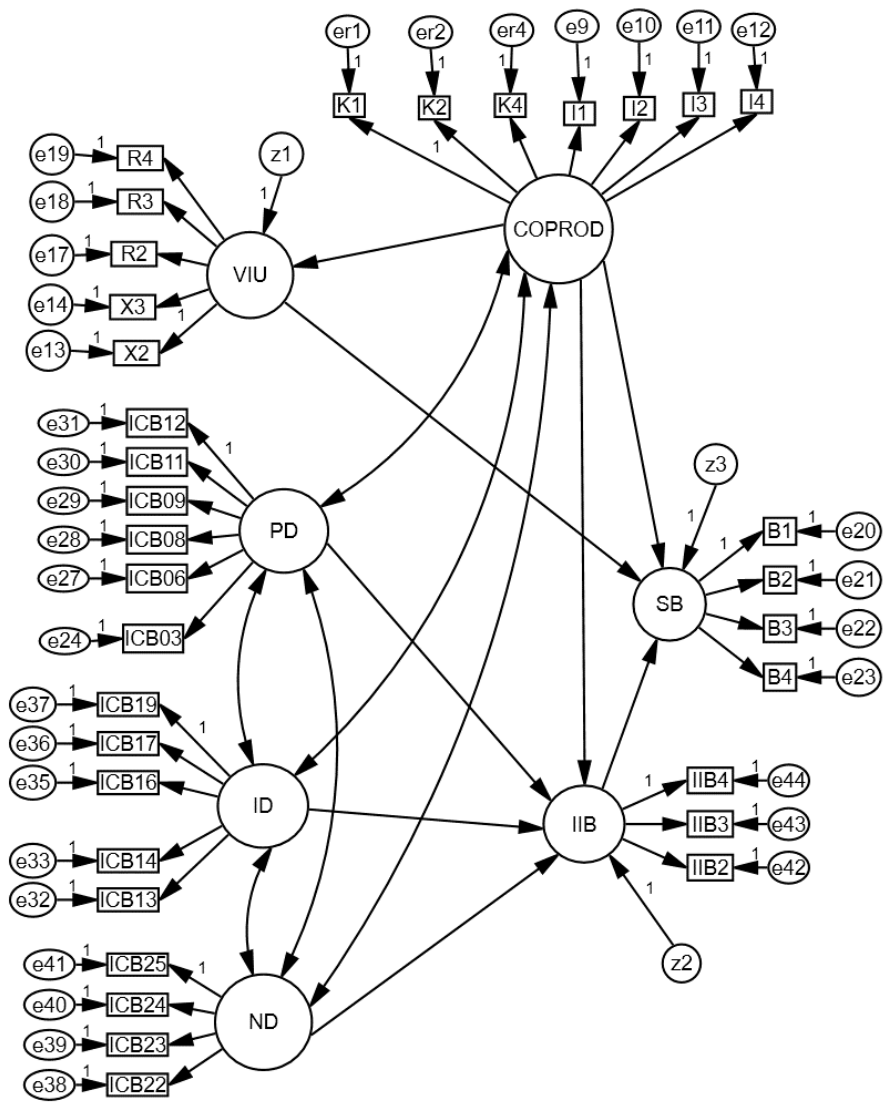
Figure 5.7: Initial structural model that has been used to test the path analysis
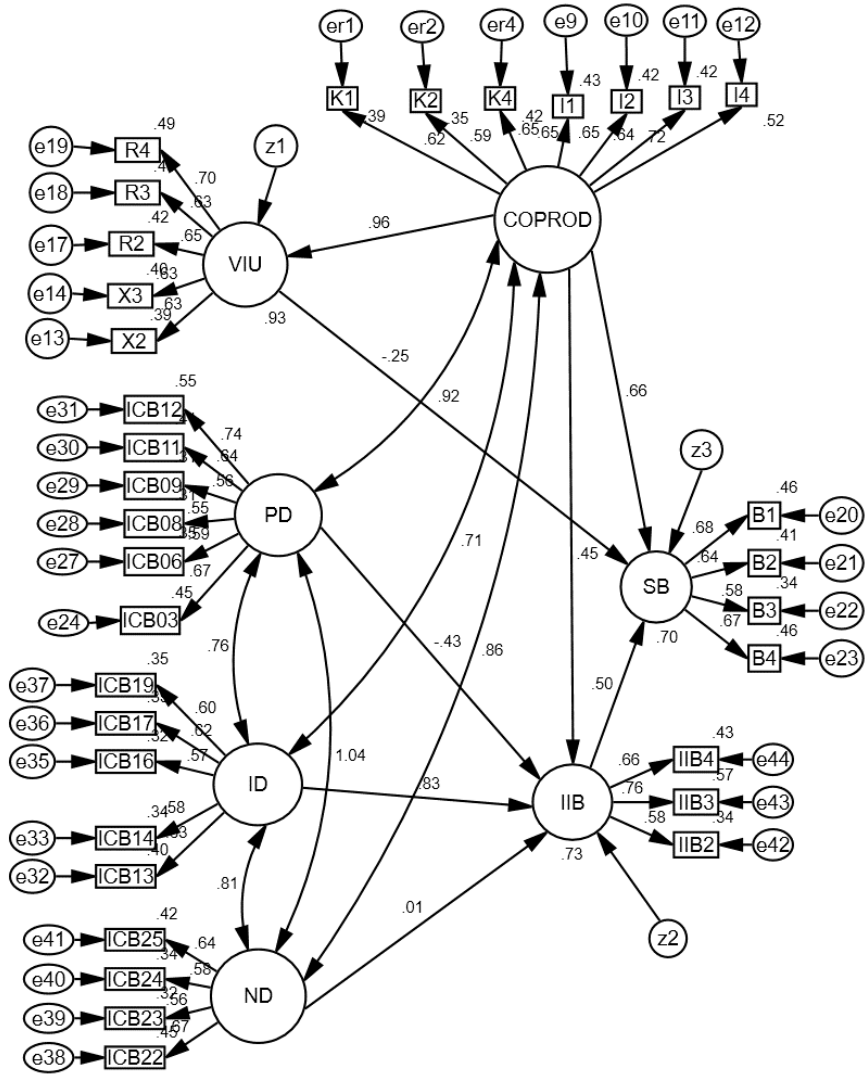
Figure 5.8: Initial structural model that has been used to test the path analysis (standardised)

	Estimate			Estimate			Estimate
IIB	.730		B4	.455		ICB25	.415
VIU	.929		B3	.339		ICB24	.336
SB	.701		B2	.409		ICB23	.316
IIB2	.341		B1	.461		ICB22	.448
IIB3	.571		I4	.523		ICB19	.354
IIB4	.429		I3	.415		ICB17	.387
R4	.494		I2	.421		ICB16	.325
R3	.400		I1	.428		ICB14	.338
R2	.425		K4	.421		ICB13	.399
X3	.399		K2	.352		ICB03	.447
X2	.393		K1	.385		ICB06	.346
						ICB08	.306
						ICB09	.308
						ICB11	.409
						ICB12	.546

Table 5.12: SMC of the structural model

As mentioned earlier, the SMC is similar to the R^2 measure used in multiple regression analysis. It is provided for each endogenous variable. For instance, from table 5.12, it is clear that the SMC for the endogenous variable value-in-use (VIU) is 0.929, which indicates that 92.9% of variance in VIU is explained by the exogenous variable co-production. As far as other observed variables are concerned, the readings provided by AMOS are found to exceed the acceptable value of 0.3, thus confirming that all readings meet the requirements. After testing the SMC, the next step was to test the criterion that the model is having a unique solution for it and every one of its parameters. This is called theoretical model identification (Abramson et al., 2006). This test is used to check whether the model produced by the software converges when it is used to conduct data analysis based on SEM. If a model does not converge, then there is a need to respecify the model (Kline, 1998; Ullman, 2001). Three tests are suggested in the literature to check the identifiability of a model. These are: recursiveness, multicollinearity, and the adequacy of the number of parameters used in the model (Abramson et al., 2006).

A model is considered to be recursive if it is unidirectional, and AMOS provides the report on such. Table 5.13 shows the report from AMOS which indicates that the model is recursive.

Table 5.13: AMOS report on the recursiveness of the structural model

Multicollinearity was tested using sample correlations. The AMOS generated report on sample correlations is provided in Table 5.14. According to Holmes-Smith et al. (2006), if sample correlations exceed 0.8 then multicollinearity is considered to be present. As mentioned earlier, the presence of multicollinearity shows that observed items expected to measure a latent construct do not measure the concept they are expected to measure. Table 5.14 shows that none of the correlation values exceed 0.8 indicating the absence of multicollinearity.

	IIB2	IIB3	IIB4	CB25	CB24	CB23	CB22	CB19	CB17	CB16	CB14	CB13	CB03	CB06	CB08	CB09	CB11	CB12	R4	R3	R2	X3	X2	B4	B3	B2	B1	I4	I3	I2	I1	K4	K2	K1
IIB2	1.0																																	
IIB3	0.5	1.0																																
IIB4	0.4	0.5	1.0																															
CB25	0.2	0.3	0.3	1.0																														
CB24	0.1	0.3	0.3	0.4	1.0																													
CB23	0.3	0.3	0.2	0.4	0.2	1.0																												
CB22	0.2	0.3	0.3	0.4	0.4	0.4	1.0																											
CB19	0.3	0.4	0.3	0.3	0.3	0.3	0.3	1.0																										
CB17	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.4	1.0																									
CB16	0.3	0.4	0.3	0.3	0.3	0.2	0.3	0.4	0.4	1.0																								
CB14	0.3	0.4	0.3	0.2	0.3	0.3	0.3	0.4	0.4	0.3	1.0																							
CB13	0.3	0.4	0.3	0.3	0.3	0.3	0.4	0.3	0.4	0.3	0.4	1.0																						
CB03	0.3	0.4	0.4	0.4	0.3	0.4	0.5	0.2	0.3	0.3	0.3	0.4	1.0																					
CB06	0.2	0.3	0.2	0.4	0.4	0.3	0.4	0.2	0.3	0.3	0.3	0.3	0.3	1.0																				
CB08	0.2	0.2	0.3	0.4	0.3	0.3	0.3	0.3	0.2	0.3	0.2	0.3	0.4	0.3	1.0																			
CB09	0.1	0.2	0.2	0.4	0.3	0.3	0.4	0.3	0.2	0.3	0.2	0.3	0.3	0.2	0.3	1.0																		
CB11	0.2	0.3	0.2	0.4	0.4	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.5	0.3	0.3	1.0																	
CB12	0.2	0.3	0.3	0.5	0.5	0.4	0.5	0.4	0.3	0.4	0.3	0.4	0.5	0.5	0.4	0.5	0.4	1.0																
R4	0.2	0.3	0.3	0.4	0.3	0.4	0.4	0.3	0.3	0.3	0.2	0.3	0.5	0.4	0.5	0.4	0.4	0.5	1.0															
R3	0.2	0.3	0.3	0.4	0.3	0.3	0.4	0.3	0.2	0.3	0.2	0.3	0.4	0.3	0.3	0.4	0.4	0.4	0.4	1.0														
R2	0.2	0.3	0.3	0.4	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.4	0.4	0.5	0.4	1.0													
X3	0.2	0.3	0.2	0.3	0.4	0.3	0.4	0.2	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.4	1.0												
X2	0.2	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.2	0.3	0.2	0.3	0.4	0.3	0.4	0.3	0.4	0.3	0.5	0.4	0.4	0.5	1.0											
B4	0.3	0.3	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.3	1.0										
B3	0.2	0.3	0.3	0.3	0.2	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.3	0.2	0.2	0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.3	0.4	1.0									
B2	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.3	0.3	0.3	0.2	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.3	0.3	0.5	0.4	1.0								
B1	0.3	0.4	0.3	0.3	0.2	0.2	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	1.0							
I4	0.3	0.4	0.3	0.4	0.3	0.4	0.4	0.3	0.3	0.3	0.2	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.4	0.5	0.5	0.4	0.4	0.3	0.4	0.4	1.0						
I3	0.2	0.3	0.2	0.4	0.4	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.4	0.4	0.5	0.4	0.5	0.4	0.4	0.3	0.3	0.3	0.3	0.5	1.0					
I2	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.4	0.5	0.5	1.0				
I1	0.4	0.4	0.3	0.3	0.3	0.3	0.4	0.3	0.2	0.3	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.4	0.3	0.5	0.4	0.5	1.0			
K4	0.2	0.3	0.3	0.3	0.3	0.3	0.4	0.2	0.3	0.3	0.2	0.3	0.4	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.5	0.4	0.5	0.5	1.0		
K2	0.2	0.3	0.3	0.2	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.3			1.0	
K1	0.2	0.3	0.3	0.3	0.2	0.3	0.4	0.2	0.3	0.3	0.2	0.2	0.3	0.4	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.4	0.4	0.4	0.2	0.3	0.2	0.3	0.5	0.4	0.4	0.4	0.5	1.0

Table 5.14: Sample correlation between observed variables

The next test checks the adequacy of the number of parameters used in the model. This detail is provided by AMOS, and it is possible to identify the different parameter fitments in the model to determine the nature of the model. AMOS statistically generates three different types of models, namely saturated, or over-identified, or under-identified models, based on the number of parameters. The variances and covariances are referred to as the parameters in a model (Ullman, 2006). Kline (1998) explains the meaning of the three

different models. Saturated models, also called just-identified models, are those which have the maximum number of parameters that a model can contain. Over-identified models are characterised by such parameters in a model that are fewer, when compared to the number of distinct variances and covariances in the corresponding covariance matrix. Under-identified models are those that have a greater number of parameters in comparison to the number of distinct variances and covariances in the corresponding matrix. Ullman (2006) recommends the following formula to check whether a model is identified or not. Furthermore, Ullman (2006) suggests that it is necessary to determine what are called data points to identify the model. According to Ullman (2006) data points are those which are the nonredundant sample variances and covariances, and can be determined using the following formula:

The number of datapoints $= \frac{p(p+1)}{2}$,

where p = the number of observed variables in the model. From figure 5.5, it is found that the number of observed variables is p=34. As such, the number of data points = [{34(34+1)}/2] = 595. Ullman (2006) provides guidelines as to how one can identify the model using datapoints. It is suggested that a model is identified if the number of parameters in a model is less than the number of data points. The number of parameters is the addition of the number of regression coefficients in the model (these are the ones indicated by single headed arrows in the model linking the observed variables to the latent variables as those also linking the latent variables), the number of variances (i.e. the number of observed variables) and the number of covariances (amongst the latent variables). The number of regression coefficients in figure 5.4 is = (34+8) = 42; the number of variances is 34; and the number of covariances are 6. Therefore, the number of parameters is (42+34+6) = 82. As such, it can be said that the number of data points calculated as 595 is far greater than the number of parameters present in the model, indicating that the model is identified.

The previous section demonstrates that the model developed for this research is an over-identified model as the number of parameters in the model are fewer when compared to the number of distinct variances and covariances in the model (data points). This can be verified by the model generated by AMOS. Before verification, it must be noted that AMOS produces three models, namely the default model, the saturation model, and the independence model. According to previous studies and established practice, the default model is the over-identified model (i.e. the number of parameters is found to be fewer than the number of data points) and is also the structural model of the research. The saturation model is the just-identified model (i.e. the number of parameters is found to be equal to number of data points). The independence model is the under-identified model (i.e. the number of parameters is found to be greater than the number of data points) (Kline, 1998; Ullman and Bentler, 2012; Mutuli and Bukhala, 2020). Table 5.15 provides the report generated by AMOS related to the identification of the model.

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	82	725.744	513	.000	1.415
Saturated model	595	.000	0		
Independence model	34	5877.373	561	.000	10.477

Table 5.15: AMOS report used for model identification (NPAR=Number of parameters)

Table 5.15 demonstrates that number of parameters for the default model are calculated as 82, which matches with the calculations given above. Similarly, for the saturation model, the number of parameters were found to be 595, which is equal to the maximum of number of data points that could exist in the model. This is also found to be the case in the calculations provided in the previous paragraph. Finally, for the independence model, the number of parameters was found to be 34, which is equal to the number of observed variables in the model, which also matches with the calculations provided in the previous paragraph. At this point the model is found to be identified and there is no need to free any observed variable before further tests are carried out.

The next step taken in the SEM analysis was testing the model fitness to the data. AMOS generated fitness measures, as identified in section 5.17, which are reported here. This is discussed in further detail in the following section.

5.18.3. Model Fitness

In this section, five tests were conducted. These include assessing the identified model by comparing to a baseline model, measure of parsimony, minimum sample discrepancy function test, root mean square error approximation test (RMSEA) (population discrepancy measure), assessing the identified model by comparing to a baseline model, and testing the goodness fit of the identified model and related measures. Each one of these tests is discussed next.

5.19. Assessing the Identified Model by Comparing to a Baseline Model

Degrees of freedom refer to the difference between the number of parameters in the just-identified model against that of the overidentified model. The difference is a statistic that can be used to assess whether the difference between the just-identified model and over-identified model is found to be significant or not, and to confirm the adequacy of the model (Abramson et al., 2006) using a baseline model. With reference to table 5.16 it is clear that AMOS provides a facility to compare the default model (over-identified) model with the saturated (just-identified model) and independence model (under-identified model).

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	82	725.744	513	.000	1.415
Saturated model	595	.000	0		
Independence model	34	5877.373	561	.000	10.477

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.877	.865	.960	.956	.960
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.031	.026	.036	1.000
Independence model	.150	.146	.153	.000

Table 5.16: Assessment of the identified model

According to Schermelleh-Engel et al. (2003) the independence model is considered to be a restrictive model and supposes that the observed variables are free of error, as the factor loadings are set equal to one and all variables are not correlated. However, with regard to the saturated model, the number of parameters that are considered free are equal to the sum of the number of variances and covariances in the model. This means that λ^2 = zero where λ^2 is the chi-square statistic (CMIN). As far as baseline comparisons are concerned, table 5.16 illustrates that the baseline model values of the default model are approaching that of the saturated model baseline value which is 1. The difference is narrow and shows that the over-identified model is adequate enough when compared to the just-identified model, indicating that the model fits the data. This paves the way for further analysis to be carried out on that model.

5.20. Measure of Parsimony

Models need to be simple to assess and understand that they are parsimonious. A model is tested for parsimony by testing the summary of the relationships between the variables in the model. Furthermore, a model is assessed by comparing the degrees of freedom (DF) association with the number of parameters (Weston and Gore, 2006; Falk and Muthukrishna, 2023). According to Weston and Gore (2006) a model is

said to be parsimonious if the DF are far greater than the number of parameters of the over identified model. While trying to achieve a parsimonious model researchers should ensure that model fitness to the data is not affected (Hooper et al., 2008). As for the measure of parsimony, in comparing the DF (513) and the NPAR of the over-identified model (default model) (82) (figure 5.4) one can see that the DF far exceed the NPAR. Thus, it is concluded that the model is parsimonious. At this point the goodness fit of the model was tested to check whether the model is still fitting the data and is not affected because of the parsimonious nature of the model. This is tested next.

5.21. Goodness Fit

As mentioned in section 5.17, there are many goodness fit indices that are reported by AMOS. The structural model is found to be fit to the data based on the following readings (in table 5.17).

Index type	AMOS result
GFI	0.909
Nfi	0.877
RFI	0.865
IFI	0.96
TLI	0.956
CFI	0.96
RMR	0.035
RMSEA	0.031

Table 5.17: Goodness fit of the structural model

One can observe that six indices out of eight are found to satisfy the requirement of model fit. This confirms that the parsimony of the model does not affect the fitness of the model to the data.

5.22. Minimum Sample Discrepancy Function

This is a measurement that informs the researcher about whether the structural model is correct for the sample size chosen. This is measured using (CMIN/df) test. AMOS produces a report on this which is provided in table 5.16. According to Arbuckle (2021) (λ^2/df) should be close to one although some argue that it can be as high as 3 (Byrne, 2006). Thus, table 5.16 demonstrates that the CMIN/df value produced by AMOS stands at 1.415, which is close to 1. Accordingly, it can be concluded that the minimum sample discrepancy function shows that the structural model fits the sample size chosen for data collection.

5.23. Population Discrepancy Measure Assessment

One of the tests that is widely used in research is to understand whether the model under study fits approximately well the population or not. Should there be any discrepancy, it is necessary for the researcher to address the lack of fitness of the model to the population under study. Root Mean Square Error of Approximation (RMSEA) is one of the measures used by researchers to measure the population discrepancy that could be generated due to approximations in the analysis and measure the approximate fit of the model to the population (Steiger, 1990). It is considered as one of the robust tests that can be used to measure fitness (Jackson et al., 2009). Although having limitations for instance RMSEA can be susceptible to confidence intervals and that sample size as well model complexities can be related to confidence intervals, yet RMSEA is widely recommended for use in research with caution (Byrne, 2001).

As mentioned earlier in table 5.10, acceptable values of RMSEA suggested by researchers is ≤0.08 which indicates an adequate model fit. However, Browne and Cudeck (1993) argue that RMSEA values ≤0.05 are considered as good fit, those falling in the range 0.05-0.08 as adequate fit, the ones found in the range 0.08-0.10 as mediocre fit and those found to be > 0.10 as not acceptable. Taking the above discussion into account, the RMSEA value was assessed and found to be 0.031 (table 5.17). This shows that the model fit is good and that the model satisfies the requirement of the population discrepancy measurement.

5.24. Average Variance Extracted

The literature shows that discriminant validity of the structural model needs to be tested in order to verify that the manifest variables measuring a construct in the structural model truly measure that construct, and do not measure any other construct, thus ensuring convergence of the measuring variables on the construct. One way to measure this is to use the average variance extracted (AVE) method (Purwanto and Sudargini, 2021). In their seminal paper Fornell and Larcker (1981) suggested that AVE provides a measure to test the goodness fit of a model analysed using SEM and argue that it provides a dependable method to test the convergence and differentiation criteria applicable to a structural model. Although AVE is widely used by researchers in social sciences (e.g. Moise et al., 2020; Leem, 2021) to establish both convergent and discriminant validity, Bagozzi (1981) criticised that AVE as a method that may suffer due to inconsistencies and violations of model specification. Despite such criticisms, AVE is being widely used in empirical research including those concerned with value co-creation (Chatterjee et al., 2021; Nguyen et al., 2021; Zhu et al., 2022). Accordingly, in this research AVE is used to test the convergence and differentiation criteria of the structural model.

According to Janssens et al. (2008) the formula used to calculate AVE is:

$$\frac{\Sigma(Standardised\ loadings)^2}{\Sigma(Standardised\ loadings)^2 + \Sigma Measurement\ errors} \quad \rightarrow \quad 5.1$$

The standardised loadings are extracted from AMOS report which are the standardised regression weights explained by each observed variable on a latent construct those observed variables are measuring and is provided in table 5.18.

			Regression weight
K1	<---	COPROD	0.621
K2	<---	COPROD	0.593
K4	<---	COPROD	0.648
I1	<---	COPROD	0.655
I2	<---	COPROD	0.649
I3	<---	COPROD	0.644
I4	<---	COPROD	0.723
B1	<---	SB	0.679
B2	<---	SB	0.64
B3	<---	SB	0.582
B4	<---	SB	0.675
X2	<---	VIU	0.627
X3	<---	VIU	0.631
R2	<---	VIU	0.652
R3	<---	VIU	0.632
R4	<---	VIU	0.703
ICB12	<---	PD	0.739
ICB11	<---	PD	0.64
ICB09	<---	PD	0.555
ICB08	<---	PD	0.554
ICB06	<---	PD	0.588
ICB03	<---	PD	0.669
ICB13	<---	ID	0.631
ICB14	<---	ID	0.581
ICB16	<---	ID	0.57
ICB17	<---	ID	0.622
ICB19	<---	ID	0.595
ICB22	<---	ND	0.669
ICB23	<---	ND	0.562
ICB24	<---	ND	0.579
ICB25	<---	ND	0.644
IIB4	<---	IIB	0.655
IIB3	<---	IIB	0.755
IIB2	<---	IIB	0.584

Table 5.18: Standardised Regression Weights

5.25. Calculation of (Standardised loading)^2

As an example, it is evident in table 5.18 that the observed variable K1 explains a standardised loading of 0.621. The square of the standardised loading of K1 is $(0.621)^2 = 0.386$. This way the (standardised loading)^2 for each observed variable is computed. According to Janssens et al. (2008) the (standardised

loading)[2] happens to be the squared multiple correlation (SMC) of the observed variables measuring a latent construct. As for the AVE calculations, the SMC of those observed variables that measure the independent latent variables only are used.

5.26. Calculation of the Measurement Error

As per Janssens et al. (2008), measurement error is calculated using the formula (1-SMC) where SMC is the squared multiple correlation of an observed variable. For instance, the measurement error for the observed variable is (1-0.386) = 0.614.

5.27. Calculation of AVE

Using the formula in equation 5.1 AVE is computed for latent independent constructs namely COPROD, PD, ID and ND. The AVE for each one of them is provided in different tables below.

5.28. AVE of COPROD

Using table 5.18 the various regression weights of the observed variables, required to compute the AVE for the different latent independent constructs were extracted. Table 5.19 provides the list of observed variables that measure the latent construct COPROD, namely, K1, K2, K4, I1, I2, I3 and I4 and their standardised regression weights on COPROD. The various calculations that are needed to be carried out to compute the AVE as per equation 5.1 have been computed. The resulting AVE has been calculated as 0.421 (table 5.19).

			Regression weight	SMC	1-SMC	∑SMC	∑1-SMC	AVE (Equation 5.1)
K1	<---	COPROD	0.621	0.385	0.615	2.945	4.055	0.421
K2	<---	COPROD	0.593	0.352	0.648			
K4	<---	COPROD	0.648	0.42	0.58			
I1	<---	COPROD	0.655	0.429	0.571			
I2	<---	COPROD	0.649	0.421	0.579			
I3	<---	COPROD	0.644	0.415	0.585			
I4	<---	COPROD	0.723	0.523	0.477			

Table 5.19: Calculation of AVE for the latent construct COPROD

According to the literature, acceptable values of AVE should be >0.5 (Hair et al., 2019). However, this value of AVE is lower than the acceptable level and is a cause of concern. This could mean that discriminant validity of the observed variables and the latent variable they measure is under question. One of the reasons for the low value of AVE could be that higher quantum of errors associated with the observed variables still remain than the variance explained by the construct (Hair et al., 2014) which perhaps could be a limitation of the AVE method. For instance, the minimum value of AVE suggested by Hair et al. (2019) is

>0.5 on which there is no agreement. Ronkko and Cho (2022) argue that the lower cutoff value of 0.5 is a general thumb rule and not a strict condition that needs to be met with.

Under these circumstances, researchers suggest other methods to test the discriminant validity. For instance, Zaiţ and Bertea (2011) suggest that chi-square difference test on two constructs could be one way to test the discriminant validity. In this method the recommendations of Segars (1997) were followed. It is suggested that the way forward is to test the discriminant validity. The steps involved are:

- Take two latent independent constructs with the observed variables measuring them and conduct CFA using AMOS (figure 5.9) and generate the chi-square report.
- Create a covariant model of the two latent independent constructs with the observed variables measuring them and conduct CFA using AMOS (figure 5.10) and generate the chi-square report.
- Compare the reports and if the results are significant (p-value < 0.5). If the results are significant then discriminant validity exists.

The discriminant validity test was first conducted for the two latent constructs COPROD and PD.
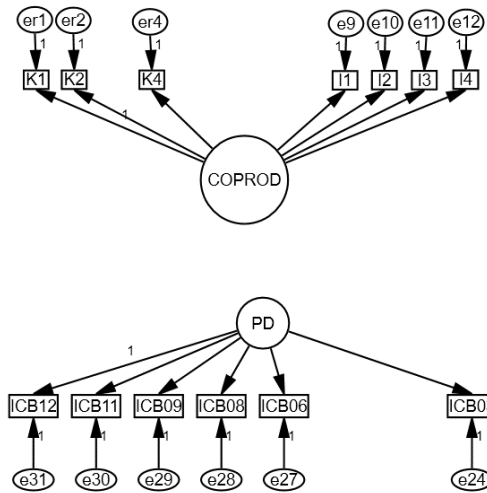
Figure 5.9: Chi-square difference test without covariance for COPROD and PD (Model 1)

204
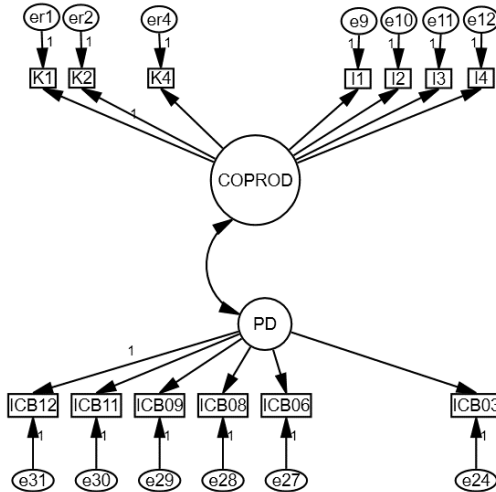
Figure 5.10: Chi-square difference test with covariance for COPROD and PD (Model 2)

AMOS report on the CFA conducted on models 1 and 2 are provided below.

5.29. COPROD-PD

Without correlation (Model 1)

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	26	396.451	65	.000	6.099
Saturated model	91	.000	0		
Independence model	13	1920.673	78	.000	24.624

Table 5.20: Chi-square test for Model 1 for the pair of constructs COPROD-PD

With correlation (Model 2)
CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	27	94.870	64	.007	1.482
Saturated model	91	.000	0		
Independence model	13	1920.673	78	.000	24.624

Table 5.21: Chi-square test for Model 2 for the pair of constructs COPROD-PD

Comparison between two models

	Model 1	Model 2	Difference in CMIN/DF between Models 1 and 2	Difference in DF between Models 1 and 2
CMIN/DF	6.099	1.482	4.617	-
DF	65	64	--	1

Table 5.22: Comparison of chi-square tests for Models 1 and 2 for the pair of constructs COPROD-PD

As per the paper of Zait and Bertea (2011), when p-value is zero or less than 0.05, the null hypothesis which says that there is no difference between the chi-square values of the two models, is rejected. This indicates that discriminant validity is established. A similar analysis was conducted with regard to the pairs of latent independent constructs with their observed variables namely COPROD-PD, COPROD-ID, COPROD-ND, PD-ID, PD-ND and ID-ND and it has been reported in appendix XI (Chi-square difference test). The results show that the chi-square difference tests confirmed that discriminant validity exists. Further to establishing the discriminant validity the next test conducted was the composite reliability which indicates whether the structural model is reliable or not. This is discussed in the following section.

5.30. Composite Reliability

This test is conducted in line with the suggestions of Fornell and Larcker (1981). According Fornell and Larcker (1981) composite reliability measures the extent of convergence by measuring the consistency of the constructs. The minimum acceptable value of the composite reliability is >0.6 (Bagozzi and Yi, 1988). However, an important criterion that needs to be established is that AVE of constructs is >0.5 although literature shows that even if AVE is less than 0.5 what is important is that composite reliability should be greater than the AVE value to establish the convergence validity of the construct. While composite reliability establishes the consistency of the constructs, AVE establishes the amount of variance explained by the construct, relative to the amount of the variance explained by the measurement error (Ambad and Wahab, 2016). The composite reliability is calculated as follows based on the guidelines of Janssens et al. (2008).

$$\frac{(\Sigma \text{Standardised loadings})^2}{(\Sigma \text{Standardised loadings})^2 + \Sigma Measurement\ errors} \quad \rightarrow \quad 5.2$$

An example of how composite reliability is calculated for an independent latent variable is provided for the construct COPROD. The regression weights for the observed variables have been extracted from table 5.19.

Observed variable		Latent construct	Regression weight	SMC	1-SMC	∑Regression weight	∑SMC	(∑Regression weight)²	∑1-SMC	Composite reliability (Eqn..5.2)	AVE (Eqn. 5.1)
K1	<---	COPROD	0.621	0.385	0.615						
K2	<---	COPROD	0.593	0.352	0.648						
K4	<---	COPROD	0.648	0.42	0.58						
I1	<---	COPROD	0.655	0.429	0.571	4.533	2.945	20.548089	4.055	0.84	0.421
I2	<---	COPROD	0.649	0.421	0.579						
I3	<---	COPROD	0.644	0.415	0.585						
I4	<---	COPROD	0.723	0.523	0.477						

Table 5.23: Calculation of composite reliability and AVE for COPROD

With reference to table 5.23, the construct reliability of COPROD is found to be 0.84 which exceeds that reference value of 0.6 that confirming that the construct COPROD is reliable. That composite reliability value of 0.84 is greater than the AVE (0.421) shows that convergent validity is achieved which is in line with the arguments given in the previous paragraphs. In a similar fashion, the construct reliability and AVE were calculated and tabulated for the four independent latent construct which is provided in table 5.24.

#	Construct	Composite Reliability	AVE
1.	COPROD	0.84	0.421
2.	PD	0.794	0.394
3.	ID	0.738	0.361
4.	ND	0.708	0.379

Table 5.24: Composite reliability of independent latent construct

With reference to table 5.24, it is found that composite reliability values of all the independent latent constructs are higher than the AVE indicating that composite reliability has been established.

5.31. Unidimensionality

This is another measurement that needs to be assessed in order to confirm that the constructs in the final model are reliable and unidimensionality is one way to establish that (Janssens et al., 2008). Vijayamohanan and Asalatha (2020) argue that unidimensionality enables a researcher to test whether the observed variables seeking to measure a construct indeed measure only one construct or one dimension. This argument is supported by Janssens et al. (2008) who claim that one of the ways by which unidimensionality is measured is using the critical ratio of each observed variable that is generated by AMOS. According to Janssens et al. (2008) AMOS generates a report that provides Maximum likelihood estimates of the regression weights (table 5.25) in which the critical ratio (C.R.) values of all unidimensional observed

variables should be higher than 1.96 and all regression weights of the observed variables be greater than 0.5 with p-values being significant (that is less than 0.05). The lack of unidimensionality indicates the presence of multidimensionality meaning that a set of observed variables expected to measure the same latent measure can measure other latent variables also which can cause problems in measurement (Ogunsakin, 2022).

Maximum Likelihood Estimates							
Regression Weights: (Group number 1 - Default model)							
			Estimate	S.E.	C.R.	P	Label
K1	<---	COPROD	1.000				
K2	<---	COPROD	.837	.079	10.665	***	par_1
K4	<---	COPROD	.950	.084	11.351	***	par_2
I1	<---	COPROD	.951	.083	11.436	***	par_3
I2	<---	COPROD	.942	.083	11.401	***	par_4
I3	<---	COPROD	.915	.081	11.311	***	par_5
I4	<---	COPROD	1.083	.088	12.362	***	par_6
B1	<---	SB	1.000				
B2	<---	SB	.866	.079	11.007	***	par_7
B3	<---	SB	.800	.079	10.170	***	par_8
B4	<---	SB	.934	.082	11.436	***	par_9
X2	<---	VIU	1.000				
X3	<---	VIU	.909	.082	11.103	***	par_10
R2	<---	VIU	.936	.083	11.234	***	par_11
R3	<---	VIU	.937	.085	10.968	***	par_12
R4	<---	VIU	.990	.082	12.062	***	par_13
ICB12	<---	PD	1.000				
ICB11	<---	PD	.924	.071	13.101	***	par_14
ICB09	<---	PD	.745	.067	11.177	***	par_15
ICB08	<---	PD	.752	.067	11.289	***	par_16
ICB06	<---	PD	.813	.068	12.029	***	par_17
ICB03	<---	PD	1.025	.075	13.736	***	par_18
ICB13	<---	ID	1.248	.125	9.946	***	par_19
ICB14	<---	ID	.960	.101	9.496	***	par_20
ICB16	<---	ID	.993	.106	9.336	***	par_21
ICB17	<---	ID	1.077	.108	10.005	***	par_22
ICB19	<---	ID	1.000				
ICB22	<---	ND	1.092	.090	12.109	***	par_23
ICB23	<---	ND	.865	.083	10.454	***	par_24
ICB24	<---	ND	.929	.086	10.789	***	par_25
ICB25	<---	ND	1.000				
IIB4	<---	IIB	1.000				
IIB3	<---	IIB	1.193	.100	11.968	***	par_26
IIB2	<---	IIB	.942	.096	9.811	***	par_27

Table 5.25: Test of unidimensionality

Table 5.25 evidences that all observable items are found to have a C.R. value greater than 1.96 and all regression estimates are above 0.5. Thus, it can be concluded that the unidimensionality of the observed variables has been established. Although there are a few methods like the Rasch model analysis (Hamzah et al., 2022), the method suggested by Janssens et al. (2008) appears to be a simple and a straightforward way of measuring unidimensionality, hence it was used in this research. Rash model in comparison has been criticised as not appropriate for use in testing unidimensionality where large-scale item banks are employed, and empirical exploratory analysis is important in place of uncritical acceptance of assumptions (Goldstein and Blinkhor, 1982).

5.32. Common Method Bias

An important measurement that provides knowledge to the researcher regarding the existence of method bias in the measuring instrument is the common method bias. This is also termed as common method variance, which is said to occur when the measured variables are latent, and the same survey is used at one point of time to collect of data to measure those latent variables and measured using the same survey at one point of time. The existence of method bias can affect the true correlations amongst the latent constructs (Fuller et al., 2015; Sundaram, 2016). While the usual method of testing common method variance is the Harman's single-factor test (Sundaram, 2016), this test has been criticised by researchers as inadequate for measuring the presence of CMV in the data (Podsakoff et al., 2003). An alternative method suggested by researchers is the utility of the exploratory factor analysis (Sundaram, 2016) who argues that a set of observed variables when subjected to exploratory factor analysis, if a single variable only is brought out as a factor (accounting for over 50% the variance) (Fuller et al., 2016), then it is said that common method variance exists. However, if the exploratory analysis of those items produces more than one factor then method bias or common method variance is said to be absent (Fuller et al., 2016). Thus, in this research exploratory factor analysis was used to test the presence of common method bias. The report generated by SPSS is provided in table 5.26. From table 5.26 it is shown that subjecting the observed variables of the final structural model to factor analysis has thrown up three factors with the first factor just accounting for 37.5%, indicating the absence of common method bias. Thus, it can be concluded that the data used to test the final model does not suffer due to the presence of common method bias.

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	10.122	37.488	37.488	10.122	37.488	37.488
2	1.439	5.331	42.819	1.439	5.331	42.819
3	1.191	4.410	47.229	1.191	4.410	47.229

4	.971	3.596	50.826			
5	.907	3.360	54.185			
6	.829	3.069	57.255			
7	.785	2.908	60.163			
8	.753	2.790	62.952			
9	.742	2.747	65.699			
10	.730	2.705	68.403			
11	.718	2.658	71.061			
12	.682	2.526	73.587			
13	.618	2.289	75.876			
14	.609	2.256	78.132			
15	.596	2.207	80.339			
16	.556	2.059	82.398			
17	.537	1.987	84.385			
18	.519	1.921	86.306			
19	.488	1.808	88.114			
20	.468	1.732	89.846			
21	.448	1.658	91.503			
22	.424	1.570	93.073			
23	.413	1.531	94.604			
24	.397	1.469	96.073			
25	.370	1.372	97.444			
26	.367	1.359	98.804			
27	.323	1.196	100.000			
Extraction Method: Principal Component Analysis.						

Table 5.26: Test for common method bias in the data

5.33. Analysis of the Regression Weights

The path coefficients generated by AMOS were used to conduct the path analysis in this research, where valid coefficients are those that satisfy the condition that those coefficients are statistically significant - with p-values of significance found to be ≤ 0.05.

Table 5.27 provides the report generated by AMOS tabulating the path coefficients.

			Estimate	S.E.	C.R.	P	Label
VIU	<---	COPROD	.983	.091	10.770	***	par_34
IIB	<---	PD	-.368	.319	-1.153	.249	par_38
IIB	<---	ID	.918	.157	5.857	***	par_39
IIB	<---	ND	.013	.308	.044	.965	par_40
IIB	<---	COPROD	.399	.151	2.646	.008	par_41
SB	<---	COPROD	.712	.484	1.472	.141	par_35
SB	<---	VIU	-.269	.463	-.580	.562	par_36
SB	<---	IIB	.612	.105	5.858	***	par_37

Table 5.27: Regression weights of the research model

An important aspect that warrants attention is the variance of dependent variables (VIU, IIB and SB) accounted for by the determinants/predictors (COPROD, PD, ID and ND). Table 5.12 provides this data in terms of the SMC. It is evident that the three determinants account for:

- 73% of variance in IIB
- 92.9% of variance in VIU
- 70.1% of variance in SB

5.34. Interpretation of the Results and Hypotheses Testing

Out of the eight paths for paths, namely PD → IIB, ND → IIB, COPROD → SB and VIU → SB were not found to be significant, with p-values of significance found to be greater than 0.05. Table 5.27 provides the basis for explaining the relationships that are statistically significant in different ways.

Co-production, as an independent variable, is found to have a large effect on value-in-use. The regression weight for the relationship between co-production and value-in-use was found to be positive (0.983). This implies that in a classroom setting, where teaching and learning take place, co-production of value occurs and leads to value-in-use. As explained in the literature review, co-production is associated with service. Examples of service co-production in a classroom setting in a higher education institution context could be the service co-production that occurs between the professor and the student. For instance, from the perspective of the faculty member, the service co-production concept could focus on integral education like integration of soft skills and affection, not just the cognitive transmission associated with education. The service component is the education that occurs between two actors, namely the instructor and the student (Rubalcaba, 2022). The students' experience of the service delivery, and the relationship between the student and the instructor, are important representations of the value-in-use of students (Dollinger, 2018). Moreover, the literature suggests that new students arriving at the universities could find support in terms of images, hyperlinks to webpages, question banks, power point presentations, documents that could easily downloaded, and YouTube links. These might have been produced by current students with the support of teachers/professors (Woods and Homer, 2021). Here, the students have produced knowledge and have gained experience. According to Ranjan and Read (2016) value-in-use is defined as a concept that is made of experience, relationship, and personalisation. In the example provided above, it is shown that students, while co-producing as co-actors, interact with the teachers/professors and gain experience on how to develop education material(s) for new students, which is part of value generated while using their ability to co-produce.

From the student's perspective, the service co-production concept could represent students as active co-actors in the process of education delivery and teaching. Here, the service component is the interaction between the teacher/professor and the student (Rubalcaba, 2022). Other examples include students creating podcasts or videos on social media that could be used as curricular learning resource (Lee et al., 2008; Keegan and Bell, 2011).

These examples can explain the statistically significant relationship between co-production and value-in-use. The above arguments suggest that the result of this research, indicating a valid and direct relationship between co-production and value-in-use, is supported by the findings of other researchers including Ranjan and Read (2016) and Brambilla (2016). Thus, it can be inferred that hypothesis H2 is supported.

Furthermore, the findings of this research demonstrate that there is a statistically significant relationship between co-production, as a central concept of value co-creation, and individual innovation behaviour in a classroom set up. There is a direct relationship between the two constructs that is statistically significant. The effect of co-production on individual innovation behaviour was found to be medium (regression weight 0.399). The relationship was found to be positive. The occurrence of co-production in a classroom is demonstrated through examples in the earlier discussions in this section. This is also partially supported by the theory of co-production, postulated by Ostrom (1996), which suggests that co-production occurs when diverse entities and compliments are used as co-production inputs leading to the creation of synergy. Furthermore, such synergistic outcomes can lead to, or manifest as, innovation due to the interaction between the professors and the students, which is evidenced by the outcome of this research. An example of individual innovation behaviour found in students could include the contribution of students in the co-creation of curricula design and development (Taylor and Bovill, 2018; Bovill and Woolmer, 2019; Dollinger and Lodge, 2020; McDonald et al., 2021; Galpin et al., 2022; Johnston and Ryan, 2022) and the development of alternative teaching and learning resources. Additionally, group discussions initiated by the professor in a classroom environment are found to produce novel ideas in students. For instance, novel ideas like creating and narrating a story using teamwork, employing such tools as iMovie, iPhoto or digital storyboard could imply development of innovation competency in students (Stevenson et al., 2015). Similar arguments are posited by Clark et al. (2016) who argue that co-production could be linked to innovation systems and actionable solutions. In a similar vein, Steiner et al. (2022) conceived a framework through the application of co-production theory to address policymakers and practitioners. They discuss several concepts, including innovation, personal benefits, and the value in co-production outcomes.

Within the context of the co-production of individual innovation behaviour, this could be explained and supported by the componential theory of creativity (Amabile, 1996; Valaei et al., 2017). The theory explicates the creative behaviour of individuals in association with innovation behaviour (Amabile, 2018). The results of this research demonstrate the existence of a direct, positive, and statistically significant relationship between co-production of value and individual innovation behaviour. Thus, such a relationship is conceptually supported, and in line with the findings of similar outcomes produced by other researchers, both within and outside the education sector. For instance, professors and students are found to be an indispensable part of the co-creation of innovation (Haput and Antonites, 2020). Shiu (2017) argues that innovation, which is part of the twin concepts of innovation and creativity, is considered as the base of customer value co-creation and new product development. Similarly, Roberts et al. (2013) discuss consumer motives for engagement in innovation and value co-creation. Thus, it can be concluded that hypothesis H4 is supported.

Insofar as the relationship between the three innovation competence variables, personal dimension, interpersonal dimension, and networking dimension, on the one hand, and individual innovation behaviour on the other, it was found that the relationship between the personal dimension and individual innovation behaviour – only - is directly, positively and statistically significant, as related to individual innovation behaviour (regression weight 0.918). The production of individual innovation behaviour in a classroom setting, due to the personal dimension, finds partial support from the innovation competence model developed by Penttilä et al. (2011; 2012). The personal dimension of students could indicate many things. For instance, learning to transform novel ideas into usable solutions is an example of the personal dimension competence skill playing a role in a student's ability to produce novel ideas based on learning and interacting in the classroom. The findings of this research find resonance in the arguments posited by Rautkorpi and Hero (2017), who argue that students learn to transform novel ideas into usable solutions that could be used to solve real life problems (Rautkorpi and Hero, 2017). Additionally, in today's educational settings, students are expected to produce multiple creative solutions to open-ended tasks. This, in turn, is expected to develop the students' competence and innovativeness, especially in dynamic situations (Bencze, 2010; Cropley and Cropley, 2010; McLellan and Nicholl, 2011). Such solutions, produced by students, are seen to be implemented in real life by providing the students a chance to use those solutions in practical situations, thus, manifesting value (co-created value) in a world surrounding students (Lepistö and Lindfors, 2015). As such, the findings of this research indicate a direct, positive, and statistically significant relationship between the personal dimension of innovation competence and individual innovation behaviour. However, this is a new finding that contradicts the position of Penttilä et al. (2011; 2012). According to the competence model, developed by Penttilä et al. (2011; 2012), the

personal, interpersonal, and networking dimensions operate together leading to innovation competence. However, this research found that both the interpersonal and networking dimensions were not found to operate together to develop innovation competence. Only the personal dimension was found to be related to innovation competence. It appears that in the context of a classroom setting, innovation behaviour of a student could largely depend on the personal dimension. The reason for the non-operation of interpersonal and networking dimensions could be the large impact of personal dimension in individual innovation behaviour within the classroom. There is evidence in the literature to suggest that innovation and personal competence can co-exist in a classroom setting, for instance, the research findings of Marín-García et al., (2013). Such a situation could occur potentially and practically. For instance, creativity and persistence are considered personal skills that are useful in developing the innovation competence (Marín-García et al., 2013). Students' creative skills are a focus in many HEIs, and efforts are continuously made to tap the potential students have to be creative. Thus, it is possible to conclude that hypothesis H5a is supported.

Finally, the relationship between individual innovation behaviour and student benefits was found to be statistically significant, with the individual innovation behaviour having a direct, positive, and large effect (regression weight 0.612) on student benefits. Innovation behaviour is concerned with ideas, processes, products, and procedures that are new, novel, and worthy of adoption in organisations (Scott and Bruce, 1994; de Jong and den Hartog, 2010). These aspects are the focus of many institutions that aim to build and develop innovation behaviour in students. This occurs through encouragement to develop new ideas and projects that could be useful to the community and themselves. The definition of innovation behaviour could be explained by the S-D logic theory (Vargo and Lush, 2016). The literature shows that benefits derived out of a co-creation process can be explained through the S-D logic theory, which posits that extra value is produced in the two-way delivery of the service (Vargo and Lusch, 2014; Leem, 2021; Gunarto and Cahyawati, 2022). This indicates that value co-creation elements, including co-production, value-in-use (Leem, 2021), and innovation behaviour (Jhantasana, 2022) could be argued as influencing those benefits derived by students. The need for understanding student benefits as a construct arises out of the fact that there is a lack of understanding as to how, when, and to what extent students could derive, and enjoy, those benefits. This research has provided an example of how this happens in a classroom, where innovation behaviour is built into the students. This is corroborated in the literature. For example, Fuentes et al. (2019) argue that projects undertaken by industry may not provide valuable outcomes to clients in the medium- and long-term. This implies that the value co-created during the interaction between that industry and its client(s), and the outcome expected to be derived by the client(s), may not be beneficial to the client until after the passage of some time. A similar situation occurs in the university life of students, where students may not be able to derive immediate benefit out of their innovation behaviour but will still likely

reap the benefits over a period of time. However, there are benefits students could derive. An immediate example of this could be student satisfaction that is a co-created outcome, emerging through study at a university, which is created partly due to the innovation behaviour of the student. This line of argumentation indicates that hypothesis H6 is supported.

While the preceding explanations provide supporting and contradictory arguments that helped in the testing of the hypotheses, nevertheless, the lack of support to the hypotheses that were not accepted requires explanation. The relationship between co-production of value and student benefits was not found to be statistically significant. This may largely be due to the fact that student benefits that accrue due to co-production of value, pertaining to innovation behaviour of students, need the path COPROD $\rightarrow$ IIB $\rightarrow$ SB because the investigation in this research is on the production of innovation behaviour as value. In such a situation, students as respondents might have felt that there could be no student benefits as an outcome without the intervention of innovation behaviour in the relationship COPROD $\rightarrow$ SB. Thus, it is possible to explain the lack of a direct relationship between co-production and student benefits. This is contrary to the findings of Leem (2021). Similarly, the relationship between value-in-use and student benefit was not found be statistically significant. Students may have felt that innovation, if co-produced in a classroom, then its value-in-use could be directly derived through innovation behaviour. This implies that innovation behaviour, essentially, could be treated as one form of value-in-use. Furthermore, benefits of the value co-created through innovation behaviour may take time to realise as value to be used by the students. Hence, assuming that students have looked at innovation as a value co-created in the classroom, and that they would like to learn, develop and apply that, it is plausible that the relationship between value-in-use and student benefits was not deemed relevant to the students. This finding of this research contradicts the finding of Leem (2021) who found a statistically significant relationship between value-in-use and student benefit.

Finally, the lack of a statistically significant relationship between interpersonal skills and networking skills on the one hand, and the individual innovation behaviour on the other, could be due to the fact that innovation competency skills are a construct that could be more suitable for application in industry rather than a classroom setting. Characteristics like interpersonal skills and networking skills could be more appropriate for implementation at the industry level as opposed to a classroom setting of undergraduate students.

The result of testing the hypotheses is tabulated in table 5.28.

Hypothesis Code	Hypotheses Statement	Supported/Rejected
H1	Co-production has a positive effect on student benefits.	Rejected
H2	Co-production has a positive effect on value-in-use.	Supported
H3	Value-in-use has a positive effect on student benefits.	Rejected
H4	Co-production has a positive effect on individual innovation behaviour.	Supported
H5a	Personal dimension has a positive effect on individual innovation behaviour.	Supported
H5b	Interpersonal dimension has a positive effect on individual innovation behaviour.	Rejected
H5c	Networking dimension has a positive effect on individual innovation behaviour.	Rejected
H6	Individual innovation behaviour has a positive effect on student benefits.	Supported

Table 5.28: List of supported/rejected hypotheses

5.35. Respecification of the Model

Based on the results of the hypotheses testing, the theoretical model in figure 5.6 has been redrawn and provided in figure 5.11.
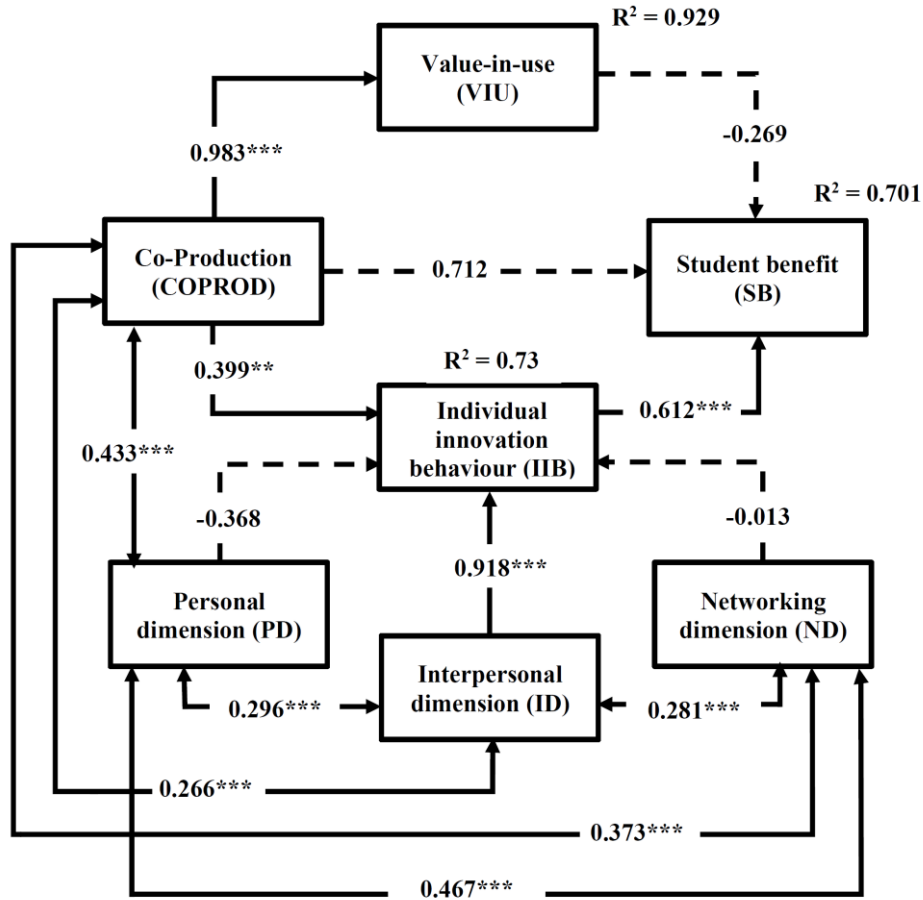
Figure 5.11: Final respecified model

Figure 5.11 illustrates the presence of a statistically significant covariant relationship amongst the independent variables. This interrelationship is important to discuss as those interrelationships could provide additional meanings to the various relationships depicted in figure 5.11. The covariance amongst the determinants is provided in table 5.29.

Covariances: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
ID	<-->	ND	.281	.036	7.878	***	par_28
COPROD	<-->	PD	.443	.048	9.303	***	par_29
COPROD	<-->	ND	.373	.044	8.526	***	par_30
COPROD	<-->	ID	.266	.035	7.519	***	par_31
PD	<-->	ND	.467	.047	9.882	***	par_32
PD	<-->	ID	.296	.036	8.148	***	par_33

Table 5.29: Covariance between the independent variables

Table 5.29 indicates that there is a positive covariant relationship between all the independent variables.

The interpretation is as follows:
- The association between COPROD and PD is one of positive and medium correlation.
- The association between COPROD and ID is one of positive and medium correlation.
- The association between COPROD and ND is one of positive and medium correlation.
- The association between PD and ID is one of positive and medium correlation.
- The association between PD and ND is one of positive and medium correlation.
- The association between ID and ND is one of positive and medium correlation.

The associations between co-production and the innovation competence variables provide a basis for examining their combined effect on the dependent variables. For instance, it is possible to argue that any change occurring in co-production could affect the three innovation competence variables. This in turn will affect the individual innovation behaviour of students, as well as the value-in-use component of value co-creation and student benefits. Similarly, when a change occurs in any or all of the three innovation competence variables, it follows that this will impact the co-production of value in the classroom. These findings are unique and not reported in any published research work. The combined effect of co-production and the three innovation competence components could be looked at as a co-innovation competence construct; a novel idea that could be used to investigate the complex phenomenon of co-creation of innovation in a classroom setting in a higher education context.

5.36. Chapter Conclusion

This chapter provided a comprehensive analysis of the quantitative data collected to investigate the value co-creation process that occurs in a classroom setting. It was found that innovation behaviour, as a value, is co-produced in a classroom in a higher education and leads to the creation of student benefits. Furthermore, co-production is seen to influence value-in-use as a factor of value co-creation. This is particularly significant in relation to the creation of innovation behaviour in students and its subsequent use by those students. Lastly, it can be said that innovation competence has a role in developing individual innovation behaviour in students. This chapter sets the basis for partially answering the research questions, which will be discussed in more detail in chapter 7.

Chapter 6 – Qualitative Data Analysis

6.1. Chapter Introduction

This chapter analyses the data gathered through semi-structured interviews that were conducted by the researcher during the period October-November 2022. This chapter provides the steps involved in data collection and the method of data analysis used. The chapter describes the strategy used in the selection of the subjects who participated in the research. Furthermore, the chapter provides the findings derived from the analysis, and how this will be related to the findings of the quantitative data analysis given in the previous chapter.

6.2. Research Design

As previously mentioned in chapter 4 covering the research methodology, this research adopts methodological pluralism. The research design chosen constitutes an explanatory sequential mixed methods design. In this method the steps followed are in line with the steps provided in figure 4.3. The first two steps, namely, the quantitative data collection and quantitative data analysis have been completed at this stage. The subsequent step comprises the collection of the qualitative data and its analysis. The research design involved the development of a research strategy for the collection of data from four different stakeholder groups. These four groups consisted of the student community, alumni, teaching faculty members, and employers. The steps involved in the data collection process have already been provided in table 4.12, which outlines a number of guidelines prescribed by Bryman (2014). The details of the design are discussed in the following section.

6.3. Research Strategy

Qualitative data can be collected through a number of ways including semi-structured interviews, case studies, grounded theory, ethnography, or action research. This research uses semi-structured interviews as part of the chosen research strategy. The reasons for selecting semi-structured interviews over other types of qualitative data collection tools are as follows (Saunders et al., 2023):

- Purpose of study: The current study explores value co-creation in a classroom in a higher education context and aims to develop an understanding of how the context supports the value co-creation process, with particular emphasis on the creation of innovation behaviour in students.
- Need for establishing personal contact with the participants: In order to understand the concept of value co-creation, it was necessary to have face-to-face interaction with the participants, as there were different entities involved in the process of value co-creation.

- <u>Nature of the questions to be asked to collect data:</u> The nature of questions was open-ended and a number of questions needed to be answered with no rigidity in relation to the order/sequence.
- <u>Time constraints and the completeness of the process and the length of time required:</u> As for the completeness of the process, the researcher had to ensure that the participants are approached in such a way that the interviews were satisfactorily completed, with the necessary data collected. Additionally, time is always a constraint. The interviewer had to decide the time at which the interview had to be conducted in advance with the participants, to ensure that there is every chance that the length of the time required to conduct the interview, or the time at which the interview was conducted did not become a problem for completion of the interviews.

The purpose of other strategies would not serve the research focus in this study. The following types of research strategies, and their non-suitability to this research, are provided based on the publications of Turhan (2019) and Creswell and Creswell (2022). For example, case studies are more useful when the researcher is studying real-life research problems in a holistic manner. In this research, the exploration is concerned with value co-creation in a classroom, across various colleges where students are studying in multiple disciplines. Hence, the case study strategy was ruled out. Ethnography is used to study that which requires examination, observation, and documentation pertaining to the relationships and behaviours of a particular group of human beings in their natural environment. There is no such ethnic entity/unit that is being studied in this research. Grounded theory relates to using theoretical sampling. In this case, the researcher continues the sampling process until such time that the whole structure is represented by the data and theoretical saturation is achieved. The researcher does not seek to ground the exploration of value co-creation to any specific theory. Furthermore, quantitative research has already confirmed the support of specific theories in the first part of the research. Hence, the grounded theory research strategy is not deemed useful to this study. Finally, action research is concerned with giving voice to the participants, and for the researchers themselves to be part of this, in order to collaborate in such a way that the research itself can be shaped. Evidence is built from both quantitative and qualitative data. In this research, there is no such need for the researcher to be part of the co-creation process in order to answer the research questions. Hence, action research, as a strategy, was neither preferred nor adopted.

Saunders et al. (2023) suggest that when a researcher undertakes an exploratory study, or where an exploratory component is involved in the research, then a semi-structured interview strategy may form part of the research design. Such a strategy enabled the researcher to probe the answers given by the participants which were further explained by the participants and built upon their initial responses. In choosing semi-

structured interviews as a strategy, the researcher considered the strengths and weaknesses of that strategy which are provided in table 6.1 below.

Strengths	Weaknesses
- Practical for in-depth conversations. - The researcher can critically examine the conversations and derive multilayered conclusions. - The researcher can follow-up the verbal and non-verbal responses, which may include the body language of the participant. This could reveal hidden information that could be used in data analysis. - The researcher can discuss various topics to highlight multiple themes. - The researcher can synthesise themes as there is flexibility. - Computers could be used in data analysis using flexible coding, leading to reliable analysis from a high number of participants in the sample. - The strategy is generative in nature; hence, the research will have a greater chance to inspire new ideas. - The interactive nature of the SSI gives room for free responses from the interviewees.	- Possibility for occurrence of data loss is potentially high if language barriers are there and face-to-face interviews are not possible. - Non-responders, if any, could lead to a lack of representativeness of the population under study. - Poor or limited response from the participants could seriously affect the interview. - The quality of the interview could be affected if the interviewer loses track of the thought process, or extrapolates the unintended meaning from a uninteresting conversation.

Table 6.1: Strengths and weaknesses of semi-structured interview strategies (Source: Kakilla, 2021)

Subsequent to the identification of the detailed strategy, the researcher set out to identify the participants for the research. This is explained in the following section.

6.4. Identification of the Subjects

Four groups of stakeholders who have a relationship with the private university in Bahrain in which this research was conducted, were approached to participate in the research. The university authorities identified

the participants who would participate in the semi-structured interviews that were planned by the researcher. The details of the participants are provided in table 6.2.

Characteristics of the participants	Student	Alumni	Faculty	Employer
Type of participant	2nd year, 3rd year, and 4th year students from different colleges studying in various disciplines.	Working in different organisations full time and having graduated within the last 5 years	Faculty members holding different academic ranks were interviewed. Those interviewed were either full professors, associate professors or assistant professors	Two of the employers interviewed were owners and three were working in public sector organisations
Experience	None of the students had any work experience	Who had work experience of between 1-5 years	>10 years	At least 5 years
Sectors/colleges	Colleges of Business and Finance, Engineering and Information Technology	Belonging to different business sectors	Belonging to four different colleges namely Arts and Science, Business and Finance, Engineering and Information Technology	Belonging to five different sectors
Gender: Male	One each from Colleges of Engineering and Business and Finance	3 persons, one each from the construction, IT and telecommunication sector	3 faculty members one each from College of Business and Finance, Engineering and Arts and Science	One owner involved in advertisement business and recruiting students from the private university
Gender: Female	One each from Colleges of Engineering, IT and Business and Finance	2 persons from the IT and telecom sector	2 faculty members one each from the Colleges of Business and Finance and Information Technology	4 female Government sector, HR, Training, and IT
Types of questions	Open ended	Open ended	Open ended	Open ended
Size of the organisations	---	Small to large	---	Small to large

All Involved in value co-creation through collaboration with different types of clients or consumers or customers.	Service consumer	Service provider/consumer	Service provider	Service provider/consumer

Table 6.2: Semi-structured interview participant details

Although the study concerns the value co-creation process pertaining to innovation behaviour and student benefits, as occurring in a classroom setting, in order to understand the dyadic process it was necessary to primarily involve students and teaching faculty. Faculty members collaborate with students to generate innovation behaviour and inculcate such in the students, who, in turn, can co-create innovation and derive benefits. Value co-creation is a dynamic process. There is evidence in the literature to suggest that it can occur instantaneously or over a period of time (Kahu and Nelson, 2018). In other words, when students are co-creating innovation, such innovation - as an outcome - could occur either during the career of the students within the university, or beyond the point of graduation. As such, it was deemed necessary that alumni could provide relevant information that could be useful to answer this research question, given the limitations concerning the ability of students to adequately assess the full extent of benefit (van Vught and Westerheijden, 2010). Finally, innovation is also recognised as an important attribute of entrepreneurs and enterprising individuals that work in industry. Hence, the input from the owners of certain establishments, or people who work in organisations where alumni of the university work, were thought to be potential contributors in the value co-creation process that is based on the classroom interaction between the students and the faculty. Accordingly, some entrepreneurial business-owners were also included as participants.

The sample size in this research comprised 5 participants, each drawn from each one of the four categories. This is in line with the guidelines provided by Saunders et al. (2023) (table 6.3).

Nature of study	Minimum sample size
Semi-structured/In-depth interviews	5–25
Ethnographic	35–36
Grounded Theory	20–35

Table 6.3: Sample sizes recommended for different qualitative research strategies
(Source: Saunders et al., 2016; p. 297)

The non-probability method of purposive sampling was used in this research. Purposive sampling requires the judgement of the researcher in selecting participants who will be best suited for the research, to help the researcher in answering the research questions. The choice of the participants to be included, or excluded, requires adequate care on the part of the researcher when selecting samples. This type of sampling method is useful when very small samples are in place and those samples are informative to the researcher. The limitation of purposive sampling includes a lack of statistical representation of the target population. This can be offset by selecting information rich samples and ensuring that the sample size is adequate in the probability sampling strategy to which the outcome of the qualitative research could be important. Thus, the samples were chosen carefully for the purposes of this research by the researcher. This was done in consultation with the authorities in the private university. This was followed by preparation on the part of the researcher to conduct the interviews.

6.5. Preparation for the Interview

The researcher was adequately prepared to conduct the interviews and accordingly planned the interview schedule and protocols well in advance. Preparations were in line with the guidelines provided by Saunders et al. (2016). Those guidelines stipulated key points including:

- level of the interviewer's knowledge
- development of themes for the interview
- furnishing information to the participants prior to the interview
- determination of the appropriateness of the intended interview location

The researcher gave careful consideration to the level of knowledge required in terms of appraising themself about the topic, through the relevant literature concerning value co-creation, related empirical studies, and the organisational and situational context in which the interviews were expected to take place.

The themes for the interview were pre-set. The themes were identified based on prior research on topics concerning value co-creation, the literature on various aspects of value co-creation, relevant theories, discussions with colleagues, and discussions with faculty members in the university in which the research was conducted. These themes were already supplied to the participants before the interview. The broad theme was the collaboration between the university and its students in co-creating innovation inside the classroom through the interactive process of teaching and learning.

Regarding the interview itself, clear information was furnished to the participants in terms of the informed consent, anonymity, confidentiality of information, privacy issues, risks (or lack thereof) and the details

about how the interview will be conducted. This was provided as part of the participant information sheet which was made available to all interviewees in advance of the interview. Participants were informed that the interview will be based on certain themes. All participants were apprised of the documentation involved, as related to ethical approval. This was done via email, wherein the consent of all participants was obtained. The schedule of the interviews was planned and determined in consultation with the participants.

The appropriateness of the intended interview location did not represent an issue. All participants were informed in advance that the interviews would be conducted through recorded videoconferencing on Microsoft Teams (MS Teams). The participants were informed that the purpose of the recording was to ensure accurate transcription, which could facilitate data analysis at a later stage. The participants were informed about the health and safety aspects which formed the basis for conducting the interviews online. This was an essential guideline to be followed by the researcher in order to adhere to the ethical approval related expectations set out by Brunel University London. The confidentiality of the collected information was stressed upon. For instance, participants were informed that the hard disc on which the information resides would be password protected, with restricted access. Furthermore, the participants were apprised of the retention of the collected data by the researcher for a certain period of time, and that the information obtained would be solely used for the purposes of academic publication. Furthermore, the researcher prepared a set of questions to put to the interviewees to begin the conversation and progressively lead a more focused discussion through posing other relevant questions. These questions were readily prepared and kept with the researcher for use. The findings of the quantitative data analysis, the literature review, and consultations with a specific set of people that included students, faculty members, alumni, and some employers, formed the basis for setting the interview questions. A sample set of questions is provided in appendix VIII.

The interviews began with a few minutes of appraisal of the participants by the researcher about the topic of innovation as a value co-created by university students in a classroom setting through a two-way interactive mechanism between the faculty members and the students. The participants were requested to be available for a period of around 30 to 60 minutes to participate in the interview. The interviews were one-to-one in nature. Conversation with the participants was in English except for in the case of one interviewee. All interviews were conducted in English on the part of the interviewer, which was fully acceptable to all interviewees, including the one who preferred to reply mostly in Arabic. The responses were translated to English immediately thereafter. There was some challenge in translating the content into English from Arabic, which was successfully overcome as the researcher is fully bilingual with both the Arabic and English languages as native tongues. Accordingly, given the participant and the researcher were

both from the Arab culture, the challenge posed in translating the contents of the interview from Arabic to English were greatly minimised, although still laborious in nature. The researcher asked the main questions and allowed the participants to respond without any compulsion. Participants voluntarily participated in the interview and were given an option to withdraw at any point in time. The discussion was interspersed with additional questions where needed, as per the nature of semi-structured interviews. The interviews provided a rich insight into the ideas and experiences of the participants vis-à-vis the co-creation of value by the university students. Each interview was conducted over 34 minutes on average. Some of the participants from the student community were innovators themselves and had prior experience with innovation. This aided the researcher to some extent in terms of asking probing questions to those students in relation to value co-creation in a classroom setting.

Although the recorded interviews were auto transcribed by the MS Teams software, the text required extensive editing to ensure transcriptions were complete and accurate. The recordings were useful in this regard, as they allowed the researcher to revisit and replay the interviews. Additionally, manual efforts were needed to filter and remove plentiful and various types of meaningless verbal pauses which were captured by the MS Teams auto transcription feature. The final set of interview transcripts was fed into a spreadsheet manually to conduct the content analysis. Microsoft Excel software was used to conduct the data analysis. The information fed into the spreadsheet was edited manually. The method used to analyse the content was thematic analysis, which is a widely used method in qualitative research method (Turner et al., 2015; Bester et al., 2021; Pathak et al., 2022).

6.6. Thematic Analysis

Thematic analysis is a widely used tool for analysing data collected through qualitative research methods (Braun and Clarke, 2006). Braun and Clarke (2006) explain that there are two broad categories of analytical methods with regard to the qualitative research method. In the first category are conversational analysis (Hutchby and Wooffitt, 1998), interpretive phenomenological analysis (Smith and Osborn, 2003), grounded theory (Strauss and Corbin, 1998; Glaser, 1992), discourse analysis (Potter and Wetherell, 1987; Burman and Parker, 1993; Willig, 2003), and narrative analysis (Riessman, 1993; Murray, 2003). All of these are part of the same category. These analytical tools are criticised for their lack in variability that could distinguish them from one another, as one recipe essentially guides them all (Braun and Clarke, 2006).

Thematic analysis lies within the second category of analytical tools. This tool is considered to be independent of theory and epistemology (Braun and Clarke, 2006). According to Braun and Clarke (2006) thematic analysis is compatible with different research paradigms, including the interpretive paradigm. The

advantages of thematic analysis include its flexibility, and ability to unearth rich, detailed, and complex accounts of data. Its limitations include a lack of clarity vis-à-vis assumptions made, how the researcher analysed data, assessed the research, and compared the outcomes of the research with other similar works (Attride-Stirling, 2001). Notwithstanding the limitations, thematic analysis is still widely used by researchers. Guest et al. (2011) argue that thematic analysis extends beyond counting specific words or phrases found in the responses given by the participants. This tool concentrates on identifying and explaining hidden ideas in the data that are both implicit and explicit, which are termed as themes. Guest et al. (2011) further explain that codes are developed using this tool that could be linked to the themes identified, and those codes are then linked to plain data as summary markers for analysis at a later stage. In this research, thematic analysis was chosen as the most appropriate data analysis tool to analyse the qualitative data collected. Important steps involved in thematic analysis include those outlined in table 6.4.

Phase	Description of the process
1. Familiarizing yourself with your data:	Transcribing data (if necessary), reading and re-reading the data, noting down initial ideas.
2. Generating initial codes:	Coding interesting features of the data in a systematic fashion across the entire data set, collating data relevant to each code.
3. Searching for themes:	Collating codes into potential themes, gathering all data relevant to each potential theme.
4. Reviewing themes:	Checking if the themes work in relation to the coded extracts (Level 1) and the entire data set (Level 2), generating a thematic 'map' of the analysis.
5. Defining and naming themes:	Ongoing analysis to refine the specifics of each theme, and the overall story the analysis tells, generating clear definitions and names for each theme.
6. Producing the report:	The final opportunity for analysis. Selection of vivid, compelling extract examples, final analysis of selected extracts, relating back of the analysis to the research question and literature, producing a scholarly report of the analysis.

Table 6.4: Phases in thematic analysis (Braun and Clark, 2006)

This research adopted the steps recommended by Braun and Clark (2006) to analyse the qualitative data collected using semi-structured interviews.

6.7. Preparation of the Spreadsheet

The researcher was already very familiar with the findings of the quantitative research reported in chapter 5. Reading and re-reading the collected data, while processing the final transcription, allowed the researcher to get reasonably familiar to the extent that themes began to emerge for extraction from the transcripts. Initial codes were used to systematically understand the themes underlying the data. Those themes were rechecked for potential use in any further research. Colour coding was also used to identify responses given by the participants, so that themes could be firmly established. After reviewing the themes in a repeated and iterative fashion, names for the themes were eventually allotted before the final report was generated.

6.8. Findings

Initially, the transcribed data was fed into a MS Excel spreadsheet. Figure 6.1 provides a screenshot of the spreadsheet where transcribed data had been keyed into the computer. Colour coding was used to identify themes, and alphanumeric characters were used as codes to represent interviewees. Examples of codes included I1 alumni, I2 alumni, and so on. The themes that were broadly selected through the first abstraction of the data are presented in tables 6.5 and 6.6. At the second level of abstraction meanings and interpretations were created on the extracted themes and their interrelationship(s). The possibility of extraction of sub-themes was present and within reach. The researcher spent considerable time and effort on that part of the analysis. The second abstraction and the first abstraction, taken together, provided support to the findings of the quantitative data analysis given in the previous chapter. This will be explained in the following section. The data analysis details are also discussed next.
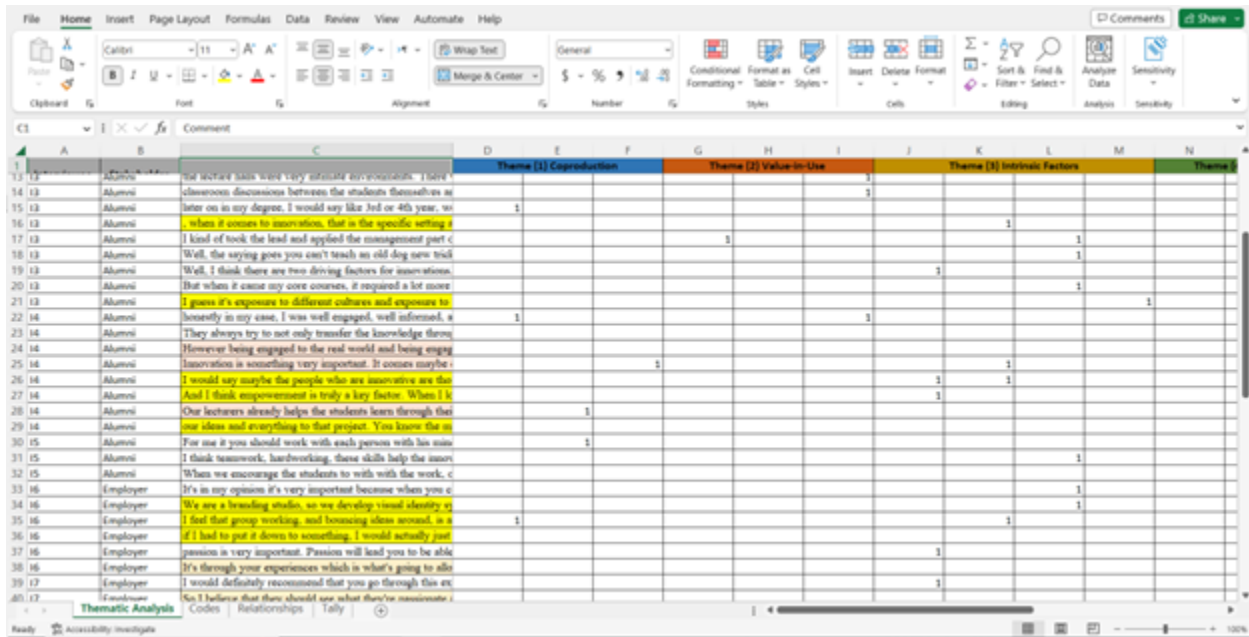
Figure 6.1: Example of the transcribed data fed into the MS Excel spreadsheet

Theme (1) Co-production			Theme (2) Value-in-Use			Theme (3) Intrinsic Factors			
Knowledge Sharing	Equity	Interaction	Personalisation	Experience	Relationship	Intrinsic Motivation	PD	ID	ND

Table 6.5: First set of themes extracted from the data with colour coding. PD=Personal Dimension, ID=Interpersonal Dimension and ND=Networking Dimension

228

Theme (4) Extrinsic Factors		Theme (5) Auxiliary Innovation Skills		
Extrinsic Motivation	Space	Market Knowledge Competence	Lifelong Learning	Transfunctional Acclimation

Table 6.6: Second set of themes extracted from the data with colour coding

6.9. Data Analysis

The initial data analysis was carried out by spotting specific words and phrases found in the transcripts that were prominent in conveying the meaning of the overall sentence. Those words and phrases that were emphatic were identified and examined to see whether they contributed to generating sentences having specific meanings concerning the research questions. Additionally, the frequency of occurrence of those key words and phrases were noted down, which allowed for themes to be extracted/corroborated. The main themes generated were co-production, value-in-use, intrinsic factors, extrinsic factors, and individual innovation behaviour. Although it may appear that these themes are an exact match of the constructs used in the theoretical model analysed in chapter 5, it must be noted that the purpose of the qualitative phase of the study was indeed aimed at this phenomenon. As such, pre-set themes were in place, with the researcher maintaining an inductive dimension to the thematic analysis approach, allowing for the possible identification of new themes or sub-themes.

The sub-themes generated were as follows:

i. <u>Co-production:</u> Sub-themes generated were knowledge sharing, equity, and interaction.

ii. <u>Value-in-use:</u> Sub-themes generated were personalisation, experience, and relationship.

iii. <u>Intrinsic factors:</u> Sub-themes generated were intrinsic motivation, personal dimension, interpersonal dimension, and networking dimension.

iv. <u>Extrinsic factors:</u> Sub-themes generated were extrinsic motivation and space.

v. <u>Auxiliary innovation skills:</u> Sub-themes generated were market knowledge competence, lifelong learning, and transfunctional acclimation.

The following table (6.7) provides transcripts of the conversation which illustrate evidence of the existence of value co-creation elements such as co-production, value-in-use, individual innovation behaviour and student benefits. The conversations also provide evidence to support the need for innovation competence as part of the value co-creation process.

Main Theme	Sub-theme	Interview Response and Interpretation	Code of the Respondents
Co-production	Knowledge sharing	*[Professors should] start the interaction with a few questions that serves the objective of explaining certain concepts or terminologies.*	Alumnus 1
		There are certain words in in the vocabulary, I agree with my students not to use throughout a given a semester or a course like student, teacher, instructor. We're more like in a coaching environment where we all learn from each other and it's based on questioning, questioning things that would tap into people's creative thinking.	Faculty 1
	Equity	*Each student has a different level of thinking. And each student you can get the level of thinking to a higher level. All students can be innovative even if they are different. And when we consider each student's abilities, we can do as something huge.*	Alumnus 5
		Our lecturers helped the students learn through their strengths. I personally have experienced this. Maybe teach tolerance and resilience. Definitely using the learning beyond the classroom. Teaching collaboration as a value, and a skillset	Alumnus 4
	Interaction	*Basically, we are looking for two ways communications. And here, I would expect professors to act as a leader of discussions. Being a leader means the professors will probably initiate the process by raising an issue, asking questions, stimulating discussions.*	Faculty 3
		The education setup is changing a lot, the old Prussian framework is outdated. That you have a tutor, or a teacher and he or she just conveys information to the students. Because we have Google, and any information is readily available with a little bit of searching. So, I think the most important thing is interaction. Trying to think critically about what there is, what and how the students is supposed to learn by the end of the course.	Employer 4
Value-in-use	Personalisation	*I think it's very important because you take this information, you have to process it, and then you need to link it with your objectives. And would this experience work for me or not and if it works, maybe parts of the experience will work for me. So, what are the parts that are relevant and how can I benefit from these and how can I take this? And so, and this is how people need to benefit from both mentorship and coaching.*	Employer 5

		Know your students from day one. Know their background, who works, where they work, check, and see if you have managers in the classroom. Even if you are teaching bachelor's degree, you don't just go in there and give them the activities and just learn their name for the sake of taking attendance. [...] Get to know your students and once you know, you will discover things and be able to cater to their needs and get them engaged in useful activities.	Faculty 1
	Experience	*It has to be engaging and interactive for them to be able to see what they're actually learning and go through it, even if they're not implementing it during the class. But just talking about it, giving different opinions will make them think about it twice. If I thought about it now, during the class, once I leave the classroom, I'll think about it tomorrow and I'll be like, why did my colleagues say that? Why did my instructor say that, and I'll try to come up with new solutions? I'll try to come up with new ideas. So, it has to be interactive and challenging. Challenges make people think, like, why are you challenging me? I can do it. I will show you that I can do it.*	Employer 2
		It [internship] was perfect. It gave me the opportunity to be an exhibitor at the gulf property show in 2018 for two companies, Line design engineering and medastate. And because of this experience, I got to be an exhibitor again at this company and another company as well. This was very helpful. A lot.	Alumnus 2
	Relationship	*I think it [relationship] improves our social skills and human skills because when you will work in a company or institution, you will need to have, aside from your own skills, you need to have human and social skills to interact with people. You need to know how to approach things. You need to know how to communicate with customers and how to create this sort of affection to attract more people.*	Student 1
		The lecture halls were very intimate environments. There were just a couple dozen students and one lecturer. Throughout the four years of my degree, I was able to build genuine connections and relationships with all my professors.	Alumnus 3
Intrinsic factors	Intrinsic motivation	*Going back to my definition of innovation, it is creativity and initiative or driving motivation. I think you can't teach creativity. It's kind of relates to innovation. You can't teach that. But you can teach how to implement it and how to materialize your ambitions, so that I learnt. How to make it into reality which are the concepts of multiple courses across my whole degree. So that, you can teach, but two sides of the same coin can't teach creativity.*	Alumnus 3

		I believe it's the passion. If I'm passionate about something, I know for a fact that I can enhance it or advance it. I love this thing. I know how it can be better, and it's also the constant development. If I keep looking at what other companies are doing, if I look at global industries, how they're currently achieving what they're doing, I can come up with new ideas and enhance their processes. I can come up with a lot of things that would help me do even better in my current role. So basically, it's the constant learning and loving what you do.	Employer 2
	Personal dimension	*At the personal level, engaging with student life in class or outside class which includes extra-curricular activities will create students with greater communication skills and their presentation skills will be higher. How to engage ideas and how to negotiate their ideas.*	Faculty 4
		I would say maybe the people who are innovative are those with entrepreneurial skills and they are more responsible. At least that's from my experience, like my real-world experience when I see people innovate. People who think outside the box. It's more of a personality type. Some people will come to you, and they're bored. They don't want to do anything. And some people come to you, they are excited. They're committed. I believe the people who are innovative need to be committed.	Alumnus 4
	Interpersonal dimension	*I think your teamwork and group work is very important and essential. Because if we are talking about innovation that will help us to improve the way we are doing things, it needs to be bounded in a realistic manner and the word realistic is when you work with a group. Because people are different and you will have different elements, emotional intelligence, some kind of work politics that makes it really realistic and practical. So, you don't talk about innovation like, for example, you talk about solutions like you are living in somewhere else while we want to implement these kind of solutions here in Bahrain. So, where you are going to have solutions needs to be implemented in Bahrain. This is when you are within a team within a group. Even if this is a smaller group, it will create kind of a culture for you and then you will realize and understand that I need to buy or to get these people to buy this innovation and for me it's just putting this innovation word in a practical context. That is having this teamwork or group work. So, innovation has to be practical, realistic and implementable otherwise there is no value.*	Alumnus 1
		I feel like people who engage more and who talk to other people, are more innovative. They are more likely to bring innovative solutions then people who don't participate in discussions. So, for example, if I have a doubt and I just keep it in and I don't ask the faculty member, then it won't be possible for me to broaden my knowledge. Once I feel like the engagement broaden the knowledge and I get to know more aspects and if my doubts have been cleared, I can become more innovative.	Student 4

	Networking dimension	*It's exposure, I'm definitely an advocate for it. I think that will kind of jump start someone's creativity and innovation. That is collaborating with and working with different nationalities, groups, people from different backgrounds.*	Alumnus 3
		So, I've been in 2 competitions, one International and one local. The international one is WTUN, which is the World Technology Universities Network. With me was student M and H. I do know them both. So, I told her please come with me. And I know that M, she has a lot of ideas and the competition was about reducing climate change. And she's so interested in it and so she brought the idea of this, which led us to 1st place and then H, and so on. So, because we worked as a team, we came in 1st place and then the second competition. In my second team it was just like that a coincidence. No one knows, knows each other. So, the second one was the right climate champions and there we were. Every student was from different universities. So, I don't really know anyone in there. Because from our university was only me and H, we were the only ones from the University and the others were all from different universities. They wanted at least 7 to 10 members and of course we were together, but we needed also still more so we just randomly picked anyone, and our team were 10. At the beginning we started to know each other. Tell us your strengths, your weaknesses. So at least we can know if we're going to divide the tasks. We can know who is strong at what. So that it's easier for us to give tasks to each one and at the end, after with our working in team, which made it easier. We did win first place again.	Student 2
Extrinsic Factors	Extrinsic motivation	*There is another way of value co-creation that happens with our students on the training side. The students that I train, If I see there is the potential in them, I then hire them as my trainers for the next batches. So, this motivates a lot the students to do better and impress you at the training center because they want to work with us eventually, and this is mainly focused on people who are fresh graduates for simpler or fundamental levels of trainings. But for more specific levels that are very at a higher end at the governance and management level, we have it from our clients. Then what happens is this client, because he is the trainer of this course, they recommend us for their institution to train their staff with us, so it goes in a circle because you created the value to this person and this person created the value by delivering their service as well as a trainer to us. This made the value co-creation a continuous process. It doesn't stop at one level.*	Employer 5
		I have to mention that games, not only give them ready made games to play, but also in the course of organization behavior, I give them the opportunity to learn how to develop games. This would deliver a material with the aim for them to for their audience to learn a certain concept in management. This creates motivation for students to engage.	Faculty 1

	Space	*When it comes to students again in a classroom for sure you will have people that they have this skill or gift from God and you have the others. So, again it will be the responsibility of the instructor to make that classroom a safe space and try to have all the conditions that will really help and push people or students in this case to innovate. These conditions need to be present within a classroom. So once the environment is set, then we can start pushing people into more innovation.*		Alumnus 1
		I feel that group working, and bouncing ideas around, is a sure-fire way to be able to be innovative. Because if you have a safe and open space where there's never, there's no wrong. Then There's no wrong idea or no wrong answer, and you're able to just like bounce ideas and build on ideas. [...] So, our ideas on paper look very different to the end product and that's through multiple revisions and ideas and tests and things like that. So that's why I'm a strong believer of group work and brainstorming and think tanks and all of these things because they really do allow a person to speak without being judged and they're able to give their ideas and opinions through collaborative efforts. I guess from an academic standpoint, if instructors and professors are open to their ideas and they are willing to listen and challenge and discuss and if you were to give an idea or challenge a professor and they were to say no, that's wrong.		Employer 1
Auxiliary Innovation Skills	Market knowledge competence	*If I had to put it down to something, I would actually just say it's the real-world experience. When you see something, you resonate with that, that thing which may trigger something in your mind to make you more ambitious, to innovate and to create. And that's the way I see it. I'm the I'm the kind of person that if I see something, I always try to pick the flaws in it and say, how can I make that better? How can I innovate that thing to make more suitable for the end user?*		Employer 1
		[...] we had the entrepreneurship week where I have seen a lot of my friends [participate]. I know them on a personal level, but then I haven't seen them on a professional level. But seeing them bringing their own products, selling them, marketing them and seeing how they have poured their time and energy into their work, opened my eyes, It showed me how different people live their own lives and look for ways to innovate. We also, for example in my marketing course, did go for trips and other activities beyond the classroom. We have visited, for example, the Toyota headquarters, where we gained a lot of rich insights. I think that all helps in innovation.		Student 1
	Lifelong learning	*I guess it's exposure to different cultures and exposure to different people through conversation. I'm a conversationalist and you know, knowledge is power. The more you learn, the more you expose yourself to uncomfortable environments. I am learning how to adapt to those. I think that will spark something in in someone to be like. I think I can improve it and I think I can make this process more efficient.*		Alumnus 3

		Let's say it's the desire for constant learning. What you know now, you did not know that 10 years ago and what you know now, I might not know it, but I can learn it. Nothing is impossible. I said that I'm bad at physics, but I actually passed physics. So, if I'm willing to learn, then I'm going to be innovative. I'm going to do good. But if I have the willingness nothing is impossible.	Employer 2
	Transfunctional acclimation	*I believe that they [innovators] should see what they're passionate about and go for it however, they need to be exposed to other things or let's say different than what they're studying. I cannot just limit myself to one thing or I have to be more open to know a little bit about finance, a little bit about engineering, and a little bit about IT because every industry now requires workers to have this minor awareness of what's happening outside of their scope of work in order to achieve a lot of creative ideas and come up with new ideas become more innovative .*	Employer 2
		I have many projects in my mind that I simply like. I'm frustrated because I do not know how to do any, how to start them, and what to do with them. I have so many ideas in my mind. Let's say lectures of the industry experts, they come to the university, like someone from a certain organization from certain field. I'm interested in and I will attend the lecture. So that I can gain experience and develop the ideas that I have.	Student 5

Table 6.7: Interview response and organisation around themes

In summary, it is evident that main themes and sub-themes are deeply inter-related, with responses of the participants supporting such interaction and interrelationship. The inference one can derive from table 6.7 is that the findings of the qualitative study corroborate the conceptualisation of the factors and the relationship between them. This represents an important finding. However, the exact names found in figure 3.1 do not occur here. Although the naming of the themes find exact replica to those in the theoretical model in figure 3.1, however, it must be understood that some of the themes and sub-themes are not an exact match. This lack of agreement between the quantitative and qualitative conceptualisations could be a reason for some of the relationships not finding statistical significance.

With regard to the reliability and validity of this research, the literature indicates that there is no specific numerical test required for use in qualitative studies. For instance, Twycross and Shields (2004) explain that in qualitative studies reliability implies whether a researcher's approach is consistent with different researchers and different projects. If the approach is consistent, then the research outcomes could be judged as reliable. As far as validity is concerned, the literature shows that it is matter of trustworthiness, utility, and dependability of the research (Zohrabi, 2013). Additionally, it is important that the researcher meets the requirements of scientific research to the maximum possible extent, through the end of the research (Oliver, 2010). On both counts, this research can be considered as reliable and valid as it has meticulously followed the recommended procedure in line with the works of other researchers who have conducted similar studies. The scientific process that has been adopted takes into account every step that is recommended in the literature and has implemented those steps accordingly.

As for data quality, this research has followed the guidelines suggested by Saunders et al. (2016) which indicate that two of the important criteria or considerations that need to be looked into are the reliability (also termed as dependability) and validity issues. On both counts this research has satisfied the requirements of the recommendation of researchers. Thus, it can be argued that, with regard to this phase of the study, the necessary quality has been appropriately and adequately embedded into the research strategy.

6.10. Chapter Conclusion

This chapter has comprehensively covered the implementation of the qualitative phase of the mixed method research. The steps followed in this research are very similar to those that have been followed by other researchers who have worked on similar projects. The findings of the research show that the outcome of the research can be utilised to prepare a report that combines both the quantitative and qualitative research findings. This is discussed in the next chapter as part of the discussions and conclusion.

Chapter 7 – Discussion

7.1. Chapter Introduction

The findings derived from the data analyses in chapters 5 and 6 require interpretation to decipher the hidden knowledge contained in the data. In this chapter the findings are discussed to uncover the knowledge produced through this research. The discussions cover the findings derived from the analysis of the data collected through both the quantitative and qualitative research methods.

The discussions surrounding the analysis of data collected, through the quantitative research method, cover the effect of the independent variables co-production and innovation competency, on the dependent variable student benefits. Additionally, the mediation effect of individual innovation behaviour on the relationship between co-production and student benefits is discussed. The hypotheses that have been supported are discussed, in addition to the ones that were found to be rejected. Those findings pertaining to the effect of the independent variables on the dependent variable, as well as hypotheses testing, are evaluated by comparing them with currently available research outcomes found in the literature. The findings of the qualitative research data analysis and their relevance are discussed as centred around the generated themes developed through thematic analysis. The different stakeholders who were interviewed provided interesting responses vis-à-vis the manifestation of innovation behaviour as a co-produced outcome inside the classroom. Particular attention is paid to the possible relationship between two or more themes derived from the data analysis based on the semi-structured interviews conducted for the research. Finally, the chapter discusses how the research questions have been answered.

7.2. Discussion of the Quantitative Data Analysis Findings

Data was collected from undergraduate students at a private university in the Kingdom of Bahrain. The highest number of responses obtained were from students studying on the Bachelor degree in Accounting and Finance programme, followed by those studying on the Bachelor degree in Banking and Finance programme, Bachelor degree in Management and Marketing programme, then the Bachelor degree in Information Technology programme. The students were given a brief on the concept of value co-creation, with definitions provided in the administered survey. The results of the analysis of the responses, provided in chapters 5 and 6, indicate that students possessed a fair understanding of the concepts of value co-creation, co-production, value-in-use, individual innovation behaviour, innovation competency, and student benefits.

Broadly speaking, based on descriptive statistics, it is reasonable to conclude that there was no discrimination or gender bias with regard to respondents, as both male (48.2%) and female (51.5%) genders were well represented and closely mirrored the actual student population. The level of interest of the students in innovation, as indicated by descriptive statistics, showed that 51.8% of the students were fully interested and 39.7% of the students were only partially interested. A meagre 6.6% of the students stated that they were not interested in innovation. This data suggests that innovation is an important concern of students. It is further implied that if innovation in the classroom is considered important, with students being encouraged to get involved in innovative thinking/behaviour, then there would be a real possibility that such innovation could be co-produced as part and parcel of the value co-creation process. This is a new finding. Within the context of programmes in which participating students were enrolled, most of the participants were found to be enrolled on the Bachelor degree in Accounting and Finance programme. This parallels the student enrolment statistics provided by the university, which indicated that this programme was the largest in the university in terms of student enrolment, when compared to other programmes. Nevertheless, the descriptive statistics show that students studying in eleven different programmes participated in the survey, making the overall participation of the sample of students representative of the larger population. The census method adopted to collect data reduced accuracy concerns and provided an equal chance for every participant to participate in the survey (Parker, 2011). Further to gaining an understanding about the participants and population, the following section analyses the direct and indirect effects of the independent variables of co-production and innovation competence on student benefits.

7.2.1. Direct and Indirect Effect of Co-production on Student Benefits

The model in figure 3.1 shows that four independent variables are expected to have an influence on the dependent variable student benefits through six different paths, as follows:

- Co-production → Student benefits
- Co-production → Value-in-use → Student benefits
- Co-production → Individual innovation behaviour → Student benefits
- Personal dimension → Individual innovation behaviour → Student benefits
- Interpersonal dimension → Individual innovation behaviour → Student benefits
- Networking dimension → Individual innovation behaviour → Student benefits

Amongst the six different paths that link the independent and dependent variable, one path, namely Co-production → Student benefits, is found to be a simple direct path between an independent and dependent variable, whereas the rest have mediators intervening in the relationship between the independent and dependent variables. These relationships will be discussed in the following sections.

7.2.2. Direct Effect of Co-production on Student Benefits

The direct effect of co-production on student benefits was not found to be statistically significant. This resulted in the rejection of hypothesis H1. One of the reasons for this could be that the participants might not have fully participated in co-creation activity in the classroom. This possibility is echoed by Brambilla (2016) who states that there are three groups of students who participate in value co-creation. The first group of students will not be interested in value co-creation. Those students may simply be interested in passing the course/module and getting the certificate only. The second group comprises those students who will be interested to co-produce value during the interaction in the classroom, with some motivation and support. The third group comprises self-motivated students who would actively participate in value co-creation. Furthermore, the literature shows that there exists a certain notion surrounding educational service whereby such a service is considered part of a social reality. As such, the interactions that occur are complex by nature (Vergara and Caldas, 2005). Such a complex environment can cause difficulty for the students and instructors to interact in co-producing value and in turn benefits for the students. The right conditions need to exist and be fostered in order for co-production to be beneficial. In such situations, it is clearly possible that students have not understood the benefits of co-production of value within the classroom. It is also possible that students would be better positioned to understand the benefits of co-creation once they are nearing the end of their studies, or immediately after graduation, at which point the students would arguably be better able to understand the true value and benefits gained.

Although this result aligns to some extent with the one arrived by Vergara and Caldas (2005), nonetheless it does contradict the results of the research conducted by Leem (2021). The reason the outcomes found by Leem (2021) produced a positive and statistically significant relationship between co-production and student benefits could perhaps be due to the fact that the research was conducted in relation to online learning platforms during COVID-19. Gherhes et al. (2021) argue that face-to-face learning has advantages and disadvantages which are distinctly different from online learning. Thus, the results of the current research, produced in the aftermath of the pandemic, provide new knowledge as the study was conducted in a classroom setting that involved face-to-face teaching and learning. Theoretically, this research advances the knowledge concerning application of the co-production theory and S-D logic theory to a classroom setting where face-to-face interaction occurs between instructors and students, and where value co-creation can be said to occur. While the theory of co-production provides some explanatory power in relation to the production of student benefits as a part of value co-creation, S-D logic theory too has addressed the value co-creation aspect. This research is one of only a few that have used the context of the immediate aftermath of the pandemic. That context provided an opportunity to address an unknown situation wherein many of the participants were attending face-to-face lectures for the first time while also possessing prior experience

of online teaching and learning. Accordingly, the results contribute to knowledge in a unique manner that has addressed a transition period in which a technology-based teaching and learning environment shifted into a normal face-to-face teaching and learning modality.

7.2.3. Discussion of the Effect of Co-production on Student Benefits Mediated by Value-in-use

The findings related to the path Co-production $\rightarrow$ Value-in-use $\rightarrow$ Student benefits show that the initial part Co-production $\rightarrow$ Value-in-use was found to be statistically significant, large, direct, and positive (regression weight = 0.983). This implies that one unit of change in co-production in the positive direction will effectuate a 0.983-unit change in value-in-use in the positive direction. Conversely, one unit of change in co-production in the negative direction will effectuate a 0.983-unit change in value-in-use in the negative direction. However, the path Value-in-use $\rightarrow$ Student benefits was not found to be statistically significant. This means that co-production does not have any effect on student benefits through the intervention of value-in-use as a mediator, as represented by the path Co-production $\rightarrow$ Value-in-use $\rightarrow$ Student benefits.

The statistical significance of the path Co-production $\rightarrow$ Value-in-use indicates that the results of this research are in line with the outcome reported by Leem (2021). The results of this study show that the relationship between co-production and value-in-use is direct, with co-production having a positive influence on value-in-use. Thus, although hypothesis H2 is supported, it is worth noting that the context of study differs to that of Leem (2021). The results of Leem (2021) talk about value-in-use as related to such aspects as time, place, and access to technology in an online learning environment. However, this research is concerned with a face-to-face teaching and learning environment, wherein value-in-use is mainly focused on innovation behaviour (Chesbrough et al., 2018) and gaining knowledge in the classroom (Brambilla, 2016). Accordingly, the outcome of this research contributes to the body of knowledge regarding value co-creation in a classroom setting, in a complex service delivery context (i.e. higher education) where numerous touchpoints exist through face-to-face interactions over an extended period of time. Theoretically, this research extends the application of S-D logic theory and co-production theory towards the understanding of value co-creation in a classroom setting. Both theories are sufficient to explain the occurrence of co-production and value-in-use in a classroom setting. For instance, if one applies Ostrom's (1996) theory of co-production, instructors and students are found to provide complementary inputs in a synergistic manner towards the production of value-in-use. In such a situation, value-in-use could manifest as the shared experience of the students in the process of innovation in the classroom. This shared experience is supported by S-D logic theory which posits that value is co-created in a relationship that involves an interaction between the service provider (instructor) and the service receiver (student).

The following discussion provides an explanation for the lack of statistical significance vis-à-vis the relationship between value-in-use and student benefits, while taking into account the example of innovation as a value that is co-produced in a classroom, and the role of innovation as part of value-in-use. If the definition of value-in-use, as given in section 2.8.2.1 in the literature review, is understood, then it is possible to explain this anomalous situation. For instance, value-in-use is defined as the customer's consumption of their usage experience to assess the value of a service or good (Vargo and Lusch, 2004; Ranjan and Read, 2016). Brambilla (2016) states that it is a difficult concept to understand. This could be one of the reasons why value-in-use did not find statistical significance in its relationship with student benefits. Accordingly, hypothesis H3 was rejected. However, this result stands in opposition to the one reached by Leem (2021) who found that a statistically significant relationship exists between value-in-use and student benefits. The reason for such could also be explained by the fact that Leem investigated students studying online, and not a classroom setting where face-to-face interactions take place. Given such difference between online teaching and learning and face-to-face teaching and learning with regard to the way students interact with faculty members, the research conducted by Leem (2021) could be criticised for not being generalisable, due to the particularities of online learning. Thus, while this research aligns with some of the arguments of Brambilla (2016) on the one hand, it differs from the outcomes achieved by Leem (2021) on the other.

From a practical standpoint, examples of student benefits, identified in the literature as accruing due to the value co-creation process, can include quality of interactions, higher satisfaction, and advanced graduate capabilities (Dollinger et al., 2018). The quality of interactions could lead to many tangible and intangible benefits over a period of time, and not necessarily instantaneously. An apt example is innovation itself. When students innovate through a high-quality interaction process, it follows that the consumption of that innovation by the students themselves may or may not happen immediately. The use-case may lag behind the production of the innovation itself, hence, the value-in-use represented by the experience gained by the students may not benefit them at the very moment when learning is taking place. An example may include students co-creating teaching materials, of which they may not necessarily fully benefit from at the time of innovation. Other students in subsequent terms/semesters will likely benefit in a more direct and substantive way from such an innovation. This brings into focus the arguments of Brambilla (2016) who states that perception of value is complex as it is not a particular kind of relationship that is relevant only for the current situation. It is a composition of the period of time before, the period of time during which it occurs, and the subsequent period of time of interaction or when exchange is effectuated. This is similar to a mental construction that can be altered by time and experiences gathered by a person. Brambilla (2016) explains

that the teaching and learning relationship in a classroom generates a prior expectation in the minds of students alongside a perception of the moment and a future reconsideration of the actual interaction that took place in the classroom. This phenomenon could be perceived differently by an actor like a student over a period of time. A classic example could be that of a faculty member who demands performance from the students while teaching a particular subject and is consequently tagged as not a nice person by students at that point in time (Díaz-Méndez and Gummesson, 2012). However, as time passes by, the faculty member could be perceived to be a high-quality professional who is competent, with the students' final assessment of the interactions and value changing radically with the benefit of hindsight. Thus, it can be argued that the lack of a statistically significant relationship between value-in-use and student benefits could be a practical occurrence that is unique to the classroom environment in a higher education institution. Practical examples that could be cited in this context include user experience of value propositions, and personalisation to user requirements, in the classroom. One such instance of user experience could include the personalisation of the innovation experience to student requirements (Prahalad and Ramaswamy, 2003). Although such a result has not been reported in the literature in the context of a higher education institution as such, nonetheless, it can be argued that value-in-use could benefit students at a later point in time. This argument is supported by Brambilla (2016).

7.2.4. Discussion of the Effect of Co-production on Individual Innovation Behaviour

The concept of the co-production of innovation behaviour in a classroom is new. Innovation is said to occur in a classroom where an exchange of ideas and experiences takes place, as part of the overall teaching and learning experience. As such, the interaction between the instructor and the students is an important condition for innovation to occur, and where such interaction takes place between the service provider and the customers, value co-creation occurs (Prahalad and Ramaswamy, 2002). In this research it was posited that the co-production of value, in terms of innovation, takes place in the classroom. The results of this research clearly point towards innovation as being co-produced in the classroom. The quantitative findings, as provided in chapter 5, demonstrate that that there is a positive, medium, and direct relationship (regression weight = 0.399) between co-production, as an independent variable, and individual innovation behaviour, as a dependent variable. This implies that when there is change of one unit of co-production in the positive direction, then a corresponding change of 0.399 units must occur in individual innovation behaviour in the positive direction. Conversely, one unit of change in co-production in the negative direction will effectuate a 0.399-unit change in individual innovation behaviour in the negative direction. At this point, it must be acknowledged that several ambiguities arise. If co-production implies co-creation of value during the process of teaching and learning in the classroom setting, then where is that value and what does innovation as a concept have to do in the value co-creation process? The answer lies in two

explanations: One provided by Prahalad and Ramaswamy, and the other given by Vargo and Lusch. Prahalad and Ramaswamy argue that in the modern world, for value to be co-created with customers, innovation has to focus on the co-creation experience. Accordingly, value can be said to reside in the co-creation experience enjoyed by the customer. This also implies that innovation is an integral part of the value co-creation experience of the customer. On the other hand, Vargo and Lusch argued that where there is an interaction between the service provider and consumer of the service, value co-creation should occur. In this argument value co-creation is discussed without consideration of the value co-creation experience, innovation, or innovation competency for that matter. The only inference that can be made using the arguments of Vargo and Lusch is that value co-creation must occur in the operation of the relationship between co-production and individual innovation behaviour, although where that value resides is not clear.

The above discussions point to a contradiction between the arguments of Prahalad and Ramaswamy on the one hand, and Vargo and Lusch on the other. Prahalad and Ramaswamy articulately address such questions as what is the value that is co-created, where does it reside, and how does innovation provide ground to anchor the value co-creation experience of the customer. In a similar vein, Vargo and Lusch emphatically argue for the occurrence of value co-creation when the service provider and customers interact. However, the arguments of Vargo and Lusch appear to fall short of providing a comprehensive explanation of value co-creation, as their arguments fail to make any explicit reference to co-creation experience and innovation. Additionally, the explanation of Prahalad and Ramaswamy does not go far enough to declare innovation, or innovativeness, or innovation behaviour, as value that is co-created and experienced by the customer. More recently, some researchers have argued that innovation should be considered as a value that is co-created when interaction takes place between the service provider and the consumer of the service. Nguyen et al. (2021) found that value co-creation directly and positively influences word-of-mouth about an institution, which in turn is influenced positively by the innovation experience of the students. Additionally, there is evidence to suggest that co-production is linked to innovation in a classroom setting through an interaction between instructors and students, where these instructors and their students share experiences (Ramirez, 1999). Thus, the findings of this research align with the findings of Prahalad and Ramaswamy (2003), Nguyen et al. (2021), and Ramirez (1999), but not Vargo and Lusch. In the face of the findings of this research, it is possible to imply that S-D logic theory has failed to incorporate and adequately account for co-creation experience that is grounded on innovation, which is argued in this research as being an essential component in the economic activity that occurs during the interaction between the service provider and the consumer. Additionally, it is possible to see that the findings of this research could add to the arguments of Prahalad and Ramaswamy and enrich the explanation they have provided for value co-creation experience and its relationship to innovation. In recognising the fact that innovation, or innovation

behaviour, could be considered as a co-creation experience, it is possible to argue that innovation behaviour becomes the co-creation experience itself. This explanation could be linked to the term innovation experience used by Nguyen et al. (2021) to posit that the value co-created resides in the innovation experience.

Further, with the support of the arguments of Prahalad and Ramaswamy, it is possible to argue that the co-creation experience of a customer occurs only when the customer interacts with multiple entities that are connected to the business process, and not just through the interaction with the service provider alone. In the words of Nguyen et al. (2021), one of the co-creation experiences of students that occurs inside a classroom should be the innovation experience itself. Such an experience, according to Prahalad and Ramaswamy, cannot be gained through the dyadic process of teaching and learning alone. If one applies this argument, then it is possible to posit that co-production, while influencing students to gain innovation experience and helping them develop individual innovation behaviour, at the same time it is plausible to argue that additional components must be brought into the picture to support the co-creation process for such an experience in students and the development of innovation behaviour in them. This is new knowledge. Thus, it can be argued that hypothesis H4 is supported.

Furthermore, co-production of value in the classroom is supported by the theory of co-production postulated by Ostrom (1996). The theory states that co-production represents an opportunity for complementary inputs from external actors, such as citizens in a public service context, to be added in a synergistic fashion to achieve more efficacious outcomes. This implies that where there is interaction between faculty and students in a classroom there could be an exchange of ideas and experiences leading to co-producing efficacious and meaningful outcomes like innovation behaviour. Thus, this research confirms that the theory of co-production can be used to explain the relationship between co-production of value. Additionally, the operationalisation of the relationship between co-production and the individual innovation behaviour is supported by social exchange theory, which states that a person's (i.e. sender) positive behaviour with respect to another person (i.e. receiver), within the context of a relationship that is characterised by interdependence, can create a potential situation for the receiver to feel obligated to reciprocate through positive behaviour (Berber et al., 2022). However, the quality of such relationships is not explained by social exchange theory. For instance, in the context of a classroom where co-production occurs with regard to the concepts of value-in-use, innovation, and student benefits, it is seen that social exchange theory can only be applied to explain that part of the exchange that produces transactions when resources are exchanged and not the full relationship itself. This implies that the value of the exchange relationship, in terms of innovation behaviour as an experience, cannot be explained by social exchange theory. As such,

the theory needs to be revisited with modifications introduced to accommodate an element of value co-creation or co-creation experience, or both.

7.2.5. Discussion of the Effect of Innovation Competency Factors on Individual Innovation Behaviour

In this research it was argued that innovation competence has a role to play in developing innovation behaviour in students (Keinänen and Kairisto-Mertanen, 2018). Classrooms appear to be a good testing ground for this concept. In order to test the relationship between innovation competency and individual innovation behaviour in a classroom setting, this research relied upon the innovation competency framework that is related to the componential theory of creativity developed by Amabile (1996). According to Amabile (1996), in any organisation the successful implementation of creative ideas is considered as innovation, whereas creativity is defined as the generation of new, unique, and useful ideas in any field. Creativity and innovation are considered distinct, yet closely related, concepts (Phan et al., 2010). The theory explicates the creative behaviour of individuals in association with innovation behaviour (Amabile, 2018). When applied to the classroom setting, examples of creative behaviour of students can be explained by this theory.

Previous researchers explain that the concept of innovation competency can be trifurcated into the personal dimension, interpersonal dimension, and the networking dimension. This is evident in the framework posited by Penttilä et al. (2011; 2012) who argued that innovation, as a phenomenon, is a non-linear concept, and is defined by the product of the three dimensions mentioned above. Although Penttilä et al. (2011; 2012) held that the relationship between the three dimensions and innovation is non-linear in nature, they treated the three dimensions and the innovation behaviour aspect in a linear fashion. Based on the study of Penttilä et al., Marín-García et al. (2013) conceived the innovation barometer as a measuring scale for the innovation competency dimensions. This contradiction was tested by Marín-García et al. (2013) in their research in which they assessed the innovation competency of post-secondary students. Marín-García et al. (2013) found that the personal, interpersonal, and networking dimensions were positively and directly related to innovation.

In this research, a similar approach to the one adopted by Marín-García et al. (2013) was followed. The three dimensions were conceptualised as independently related to the innovation behaviour of students. The result was that the interpersonal dimension (ID) was found to have a statistically significant, large, direct and positive effect on individual innovation behaviour (regression weight = 0.918). This implies that one unit of change in the positive direction in interpersonal dimension will effectuate a 0.918-unit change in the

individual innovation behaviour in the positive direction. Conversely, one unit of change in co-production in the negative direction will result in a 0.918-unit change in individual innovation behaviour in the negative direction. However, both the personal dimension and the networking dimension did not have a statistically significant effect on individual innovation behaviour. This result is in contradiction to the results obtained by Marín-García et al. (2013). The reason for this is not easy to explain. The literature posits that the three dimensions PD, ID and ND affect innovation, and there are empirical studies similar to that of Marín-García et al. (2013) that have established such a relationship empirically. This aspect will be reviewed, in the section that discusses the analysis of the data collected through the qualitative research method, before conclusions could be drawn.

Despite the fact that two of the three innovation competency dimensions did not have a statistically significant relationship with individual innovation behaviour, it is important to recognise and interpret the meaning of the statistically significant relationship that the interpersonal dimension has with individual innovation behaviour. The first possible interpretation is that this innovation competency dimension can have a role in individual innovation behaviour that is co-produced in the classroom. Another interpretation is that the interpersonal dimension (e.g. transmission of ideas effectively, listening to teammates and moving others to act) (Marín-García et al., 2013) can be exhibited in a classroom by students, hence, the interpersonal dimension could be visible during the process of co-creation. The role of innovation competency through interpersonal skills was not recognised by Prahalad and Ramaswami (2003). In their orthogonal model, developed to describe the relationship between the locus of competence and locus of innovation, Prahalad and Ramaswamy highlighted that both experience networks (networking dimension) and experience personalisation (personal dimension) are co-created as co-creation experiences. This can potentially be construed as a limitation of the orthogonal model proffered by Prahalad and Ramaswamy (2003). From a practical standpoint, the interpersonal dimension has a demonstrable role in co-creating an experience space in the locus of innovation; a concept not addressed by the model of Prahalad and Ramaswamy (2003). The evidence is provided in table 7.3.
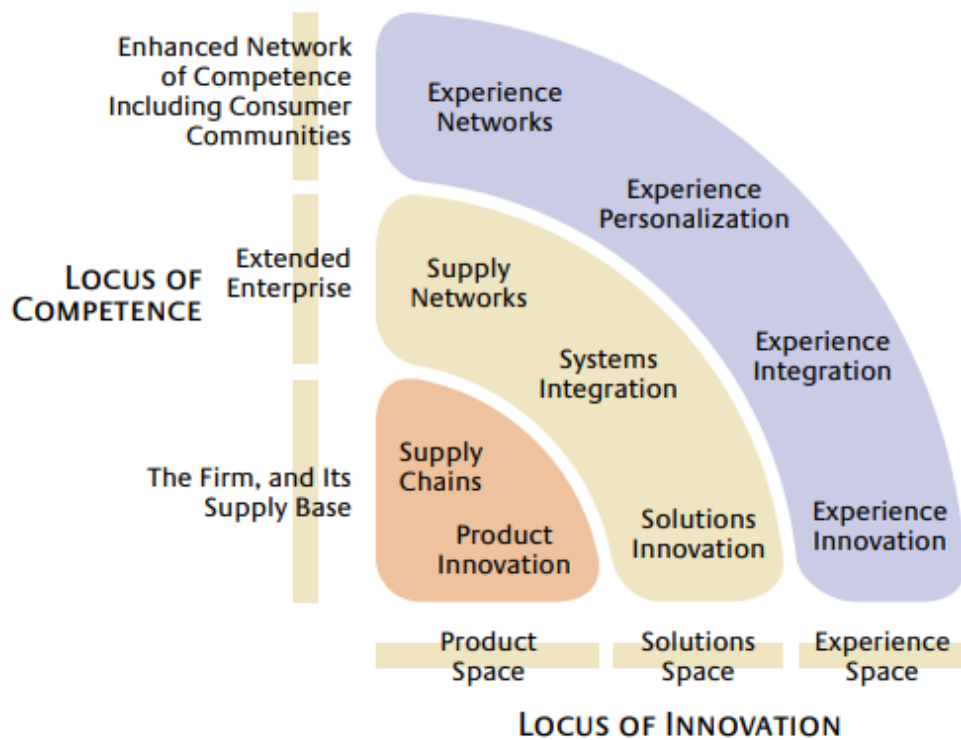
Figure 7.1: Orthogonal model developed by Prahalad and Ramaswamy
(Source: Prahalad and Ramaswamy, 2003)

The orthogonal model, however, provides evidence and support to include innovation space, hence, innovation competency in a model that studies the co-production of innovation behaviour as value in a classroom setting. Although the orthogonal model of Prahalad and Ramaswamy is only a postulation, having no backing of any empirical study as such, this research provides empirical evidence to partially support the model. Accordingly, the relationship between locus of competence (competency framework) and the locus of innovation (innovation behaviour) can be considered to be practically linked in broad terms.

The findings of this research point towards the relationship between the three competency dimensions and innovation, as posited by Penttilä et al. (2011; 2012) and shown to be a non-linear relationship between the dimensions and innovation, as in fact being linear (as opposed to non-linear). Thus, from a theoretical standpoint, the findings of this research align with the findings of Marín-García et al. (2013) only partially, insofar as they show that the interpersonal dimension of the innovation competency framework affects the innovation behaviour of students in a linear fashion. This is an important finding which constitutes new knowledge. Accordingly, it can be concluded that hypotheses 5Ha and 5Hc are rejected whereas 5Hb is supported.

7.2.6. Discussion of the Effect of Individual Innovation Behaviour on Student Benefits

The results of this research indicate that innovation behaviour is statistically significant with respect to student benefits. The relationship is direct, positive, and large in magnitude (regression weight = 0.612). This implies that one unit of change occurring in individual innovation behaviour in the positive direction leads to a 0.612-unit change in student benefits in the positive direction. Conversely, one unit of change occurring in individual innovation behaviour in the negative direction effectuates a 0.612-unit change in the negative direction. Possible examples of individual innovation behaviour include generating creative ideas and promoting and championing ideas to others (Scott and Bruce, 1994). These aspects influence student benefits accruing due to value co-creation including quality of interactions, greater satisfaction, and advanced graduate capabilities (Dollinger et al., 2018). Theoretical support to explain this relationship, as existing between individual innovation behaviour and student benefits, is provided by the Innovation Competencies Development (INCODE) Barometer, S-D Logic theory, and social-exchange theory. When evaluating the results of this research, the researcher finds that there is a scarcity of research efforts that have linked individual innovation behaviour to student benefits in a classroom setting in an environment characterised by value co-creation. However, the outcome of this research with regard to finding a statistically significant relationship between individual innovation behaviour and student benefits could also be evaluated using the orthogonal model of Prahalad and Ramaswamy (2003). According to that model, innovation experience is a value that is co-created in the experience space which occurs through the interaction of the loci of innovation and competence. Similarly, the researcher falls back on the S-D logic theory to explain the value co-creation aspect occurring in such interactions in the classroom environment. Additionally, social exchange theory helps in understanding the transaction that takes place between the student and the faculty. Lastly, the INCODE barometer provides the basis to explain innovation behaviour.

It is possible to argue that innovation behaviour is considered as a value that is co-created. This is due to the co-production activity that takes place inside the classroom, which could help student to derive benefits out of the co-created value. This co-created value is situated in the innovation behavioural aspect. Accordingly, one important benefit the students would carry with them will be the innovation experience. While value resides in the innovation experience gained by the student, the timing of meaningful exploitation of that value by the student could be an ambiguous issue. The literature suggests that there is a lack of understanding as to how, when, and to what extent students could derive, and enjoy, those benefits - an argument supported by Fuentes et al. (2019) who investigated projects undertaken by some industries. According to Fuentes et al. (2019), the projects being executed by some industries may not provide valuable outcomes to clients in the medium and long-term. This implies that the value co-created during the interaction between an industry and its client(s), and the outcome expected to be derived by the client(s),

may not be beneficial to the client(s) until after the passage of some time. In a similar vein, Kahu and Nelson (2018) argued that the outcomes of student engagement may include some long-term outcomes, which may not necessarily be immediately apparent. An immediate example of this could be student satisfaction that is a co-created outcome, emerging through the course of study at a university. Such satisfaction could only be meaningful and beneficial to that student after he/she graduates and becomes gainfully employed. While there are claims in the literature that value-co-creation as a concept influences benefits derived by the students after the value has been consumed by the students, nevertheless there are counter claims to state that students are unaware of certain benefits, or values, which may continue to emerge as the interaction goes on (Díaz-Méndez and Gummesson, 2012; Dean et al., 2016).

One important and novel conclusion that can be drawn is that student benefit appears to be a quantity that could be distinguished from value as co-created in a classroom. It is better viewed as a culmination of the value co-creation process in terms of value-in-use and individual innovation behaviour. Thus, student benefit appears to be a composite construct that integrates these concepts. Accordingly, it is possible to conclude that the arguments found in the literature stating that the boundaries encompassing the concepts of value co-creation, its outcomes, and benefits are blurred are untenable (section 2.8.4.1). This is a new finding that adds to the body of knowledge concerning value co-creation. The above arguments lead the researcher to conclude that hypothesis H8 is supported.

The model produced by this research is characterised by a degree of complexity. Such complexity can be demonstrated by examining the indirect effect exerted by the independent variables on the dependent variables. There are three significant paths in the model that have an effect on the dependent variables. One is the path co-production → value-in-use. The second is the path co-production → individual innovation behaviour → student benefits. The third is the path interpersonal dimension → individual innovation behaviour → student benefits. AMOS provides the basis to analyse the model to understand the effect of the independent variable on the dependent variables. The combined effect of the independent variables co-production, personal dimension, interpersonal dimension, and networking dimension, on the dependent variables is as follows:
- 73% of variance in IIB
- 92.9% of variance in VIU
- 70.1% of variance in SB

This implies that 73% of variance in IIB, 92.9% of variance in VIU and 70.1% of variance are accounted for by the independent variables combined effect. Table 7.1 provides the direct and indirect effect of each of the independent variables on the dependent variables.

	ND	ID	PD	COPROD	IIB	VIU	SB
IIB	.014	.832	-.431	.452	.000	.000	.000
VIU	.000	.000	.000	.964	.000	.000	.000
SB	.007	.417	-.216	.641	.501	-.254	.000

Table 7.1: Standardised total effect of the independent variables on the dependent variables

Table 7.1 illustrates the indirect effect of 0.641 by the independent variable co-production (COPROD) on the dependent variable student benefits (SB); 0.964 unit on the dependent variable value-in-use (VIU) and 0.452 unit on the dependent variable individual innovation behaviour (IIB). This implies that a unit of change in the positive direction of COPROD will effectuate a change of 0.641 unit in SB, 0.964 unit in VIU, and 0.452 unit in IIB respectively in the positive direction. In other words, when COPROD increases then the magnitude of SB, VIU, and IIB will increase. Conversely, one unit of change in COPROD in the negative direction will effectuate a 0.641-unit change in SB, 0.964 unit in VIU and 0.452 unit in IIB, respectively, in the negative direction. Thus, when COPROD decreases, it follows that the magnitude of SB, VIU and IIB will decrease as well. Accordingly, it is clear that COPROD effectuates a large change in SB and VIU, whereas the change in IIB is medium in magnitude. However, the effect of COPROD on VIU and IIB is direct, while its effect on SB is indirect (mediated by IIB).

Similar arguments can be extended with respect to the effect of interpersonal dimension (ID) on individual innovation behaviour (IIB) and student benefits (SB). Table 7.1 illustrates the direct and large effect ID exerts on IIB in the positive direction. This means one unit of change in ID in the positive direction effectuates a change of 0.832 on IIB in the positive direction. Conversely, when ID changes by one unit in the negative direction, it effectuates a 0.832-unit change in IIB in the negative direction. In other words, when ID increases, the magnitude of IIB increases, and when ID decreases, then the magnitude of IIB decreases. Similarly, ID is found to exert an indirect, positive, and medium effect on SB. In other words, a one-unit change in ID in the positive direction effectuates a change of 0.417 on SB in the positive direction. Conversely, when ID changes by one unit in the negative direction, this effectuates a 0.417-unit change in IIB in the negative direction. In other words, when ID increases, the magnitude of SB increases and when ID decreases, then the magnitude of SB reduces.

In addition to the above, the association between the four independent variables enables an interaction amongst the variables. This implies that even though the independent variables personal dimension (PD) and networking dimension (ND) did not have any statistically significant influence on the dependent variables, nonetheless, they have a statistically significant covariation with COPROD and IIB. This further implies that any variation in PD and ND could cause variation in COPROD and ID and vice-versa. This suggests that co-production in the classroom can affect the innovation competency constituent components and vice-versa. This confirms the fact that innovation competency needs to be recognised as an intrinsic and/or an extrinsic factor that affects co-production, hence, value co-creation in the classroom. Such a combined effect (co-production and the three innovation competency factors) could be configured as a novel composite concept; termed as 'co-innovation competency' by the researcher. This is a novelty achieved through this research.

In conclusion, it can be argued that the outcome of the testing of the theoretical model in figure 3.1 shows that a number of new findings have emerged which contribute to knowledge. Furthermore, there are several implications to theory and practice that could be extracted from this discussion which will be reflected in the conclusion. Finally, it is important to understand how the outcomes of the discussions concerned with the quantitative data collection and analysis phase compare with those of the qualitative data collection and analysis phase.

7.3. Summary of the Research Findings and their Evaluation

A summary of the findings of this research, and an evaluation of those findings with the extant literature, are provided in table 7.2 below.

#	Research Findings	Evaluation of Research Findings
1.	The direct effect of co-production on student benefits was not found to be statistically significant.	This possibility is echoed by Brambilla (2016). Thus, the research findings find support from the literature. The result aligns with the findings of Vergara and Caldas (2005) but contradicts the results of the research conducted by Leem (2021).
2.	Co-production has a positive influence on value-in-use.	This outcome is in line with the findings of Leem (2021).
3.	The relationship between value-in-use and student benefits lacks statistical significance.	This finding contradicts the findings of Leem (2021) who found a statistically significant relationship between value-in-use and student benefits. However, this result aligns with the arguments of Brambilla (2016).

4.	Co-production positively influences individual innovation behaviour.	This finding aligns with the findings of Prahalad and Ramaswamy (2003), Nguyen et al. (2021), and Ramirez (1999), but contradict the one found by Vargo and Lusch (2004).
5.	Innovation competency factors: The results of this research show that the personal dimension and the networking dimension do not have a statistically significant effect on individual innovation behaviour. However, the interpersonal dimension was found to have a statistically significant relationship with individual innovation behaviour.	The results of this research showing that the personal dimension and networking dimension do not have a statistically significant effect on individual innovation behaviour contradict the findings of Marín-García et al. (2013) and Penttilä et al. (2011; 2012). However, the other result of this research which shows that the interpersonal dimension has a statistically significant effect on individual innovation behaviour aligns with the findings of Marín-García et al. (2013) and Penttilä et al. (2011; 2012), but does not find support from Prahalad and Ramaswami (2003).
6.	The findings of this research show that individual innovation behaviour has a direct and statistically significant effect on student benefits.	The findings of this research align with the arguments of Dollinger et al., (2018) who stated that innovation influences student benefits. The findings also align with the orthogonal model produced by Prahalad and Ramaswamy (2003) who postulated that innovation experience is a value co-created in the experience space that occurs due to the interaction of the loci of innovation and competence. However, there could be some disagreement between the findings of this research and those of Díaz-Méndez and Gummesson (2012) and Dean et al., (2016) who argued that students may be unaware of certain benefits, or values, which may continue to emerge as the interaction goes on. Hence, students may not (immediately) derive benefits of the co-created value caused by individual innovation behaviour.

Table 7.2: Summary of the findings of this research and evaluation of those findings

7.4. Discussion of the Qualitative Data Analysis Findings

This research has adopted the explanatory sequential mixed method design wherein the research follows the steps outlined in figure 4.3. Accordingly, the previous sections have dealt with the quantitative data and discussed the findings, which are part of the first two steps described in figure 4.3. However, the discussions indicate that some of the conceptualisations could not be supported by theory and could not be evaluated using findings from prior research related those topics that are relevant to this research. Thus, as described in figure 4.3, the qualitative data collected for this research was analysed and findings were derived. Those findings are reported in chapter 6.

As previously mentioned in chapter 6, the qualitative data was analysed using thematic analysis. The thematic analysis produced a variety of themes related to value co-creation in a classroom setting in a higher education institution. Important points that need to be discussed in light of the findings include the following:

- Nature of interaction between faculty and students
- Concept of value co-creation and associated themes
- Concept of co-production of values and innovation in a classroom setting
- Ideas associated with co-production of innovation as value-in-use
- Student behaviour in the classroom leading to innovation behaviour
- Innovation competency as factor associated with innovation behaviour
- Student benefits accruing through innovation behaviour

The aforementioned points are discussed one by one in the following sections comprising the qualitative data analysis discussion phase of the research.

7.4.1. Nature of Interaction between Faculty and Students

Interaction is the basis of value creation. Many authors concede this (Prahalad and Ramaswamy, 2003; Vargo and Lusch, 2004; Leem, 2021). Education institutions are amongst the best examples of contexts wherein various forms of collaboration and interaction are common. The nature of interaction between the faculty and students in a classroom in the higher education institution is one of sharing experiences and exchange of ideas. Almost all students interviewed clearly pointed out that there is a bidirectional mechanism that operates vis-à-vis the teaching and learning process that takes place inside a classroom. The collaboration between faculty and students leads to many outcomes; examples of which include student satisfaction, student loyalty, contribution/service to the university, student learning, ideation, and innovation. One alumnus stated that "*Each student has a different level of thinking. And with each student you can get the level of thinking to a higher level. All students can be innovative even if they are different. And when we consider each student's abilities, we can do something that is huge.*" Taking into account many such remarks made by professors and employers as well, it is possible to conclude that the classroom setting provides an environment where collaboration and interaction between faculty and students can lead to value co-creation. Although the nature of interaction in the classroom is predominantly collaborative and has the foundation to create value or co-create value, none of the interviews had a clear idea of the concept of value co-creation. Even when a rare interviewee explained that some value is certainly created within the university, generally it was seen that knowledge amongst the various stakeholders who were interviewed on the basic concept of value creation within the precincts of the university was very shallow. This is in

line with the observation found in the literature which states that the concept of value co-creation is still new to the higher education sector. Thus, it emerged from the interaction with the students, faculty, alumni, and employers that there is a need to create awareness amongst those stakeholders on the fundamentals of value co-creation as an important concept. There is a need to demonstrate the importance of value co-creation through scientific enquiry.

7.4.2. Concept of Value Co-creation and Associated Themes

The concept of the classrooms as a real setting which enables value co-creation is well acknowledged in the literature (Prahalad and Ramaswamy, 2003; Brambilla, 2016; Nguyen et al., 2021). Nonetheless, there was a need to establish this for the benefit of the universities and its different stakeholders. Consequently, interviewees were provided with an introduction to the concept of value co-creation, co-production of value, value-in-use, students as service receivers/beneficiaries, faculty as service providers/benefactors, and HEIs as centres providing resources for value co-creation to occur. Foremost, the alumni understood and acknowledged the basics of value co-creation as they were in a position to meaningfully exploit the benefits of the value co-creation by them during their time of study at the university. The faculty members had a greater experience of co-creating value in collaboration with students. They felt that students contribute greatly to generating value and expressed the need to recognise this fact. One faculty member explained "*Value co-creation, first of all, will not take place without a healthy interaction, relationship, and partnership between the instructor or the educator, or even consider the mentor in this case and the receiver. And when it comes to co-creating values as we are co-creating then I always consider my students not just students. There are certain words in the vocabulary, I agree with my students not to use throughout a given a semester or a course, like student, teacher, instructor.*" This statement is important. The faculty member explained that students must be treated as learning partners, which is why she preferred to avoid terms like student, teacher, or instructor in the classroom. Accordingly, it can be inferred that faculty members recognise the need for developing a culture of collaboration where value co-creation can occur with students as partners.

In a similar vein, one of the alumni stated that "*[Professors should] start the interaction with a few questions that serve the objective of explaining certain concepts or terminologies*." An employer argued "*One of the things that we have noticed with fresh graduates from university is that they have a wealth of knowledge that they have received from both their professors and classmates through their years in education.*" This implies that knowledge sharing takes place within a classroom. This is an essential ingredient that contributes to co-production of value. Such knowledge sharing is considered important for innovation in the literature (Ingram et al., 2016). This is an example of a finding that emerged through the thematic

analysis of some of the responses provided by the interviewees. A complete thematic analysis of the various responses given by the students, alumni, the faculty, and the employers resulted in the extraction of several themes that are associated with the concept of value co-creation. The findings indicated that following themes as abstracted through the thematic analysis (section 6.9):

- Co-production: Sub-themes generated were knowledge sharing, equity, and interaction.
- Value-in-use: Sub-themes generated were personalisation, experience, and relationship.
- Intrinsic factors: Sub-themes generated were intrinsic motivation, personal dimension, interpersonal dimension, and networking dimension.
- Extrinsic factors: Sub-themes generated were extrinsic motivation and space.
- Auxilliary innovation skills: Sub-themes generated were market knowledge competence, lifelong learning, and transfunctional acclimation.

Accordingly, it is reasonable to conclude that while the abstraction of themes indicated that many components were interrelated (with the concept of value co-creation occurring in the classroom), nevertheless, it was interesting to find that some of them did not provide corroboration for the conceptualisations posited in this research in chapter 3. For instance, themes including co-production, value-in-use, personal dimension, interpersonal dimension, networking dimension, and individual innovation behaviour abstracted through the thematic analysis supported the conceptualisations presented through the theoretical framework in this research. However, student benefits did not emerge as an explicit theme. The outcome of the qualitative data analysis supported only some of the outcomes of the quantitative data analysis at the thematic level.

7.4.3. Concept of Co-production of Value and Innovation in a Classroom Setting

Value is continuously co-produced in the classroom. This was revealed through this study. For instance, one of the Professors pointed out that "*one of the things that would make students really in a position to contribute towards achieving such a goal (indicating co-production of value) is to look at them as being learners more than students. Having said this, to me it means basically when a student becomes a learner, it means he or she will actively participate in bringing in new ideas, which means that basically we run the classes not as one way communication. Basically, we are looking for two ways communications. And here, I would expect professors to act as a leader of discussions. Being a leader means, professors will probably initiate the process by raising an issue, asking questions, and stimulating discussions.*" This statement indicates there is an active and engaged process of learning, communicating, collaborating, interacting, generating new ideas and mentoring going on in the classroom. This represents evidence produced by this research demonstrating that value is co-produced inside that classroom. Although similar experiences are

reported by other researchers (Morgan et al., 2009; Leem, 2021), it appears that the nature of the co-produced value varies. Thus, the finding produced by this research gains currency. When one considers the importance of generation or co-production of new ideas by students in a classroom, this can be said to point towards innovation behaviour. As such, there is a need to recognise the novelty of such value co-production in the classroom. The reason for this novelty stems from the context that is particular to HEIs due to their purpose and nature. This is an important finding that cannot necessarily be explained by the quantitative study. This finding highlights the possibility of a conceptualisation that links co-production of value to innovation and provides a basis to consider the innovation behaviour of students as a co-created value, especially with regard to students that have an expressed interest in innovation.

Furthermore, the exchange of ideas as clearly manifest in the interaction and collaboration between the faculty and students in the classroom, leading up to the generation of innovation behaviour, can be considered as a co-creation experience in itself. Thus, there is evidence here to suggest that within a classroom setting, the application of S-D logic theory to explain value co-creation suffers as it does not explicitly recognise the integral role of innovation as part of the value co-creation process. This argument is supported by Prahalad and Ramaswamy (2003) who state that innovation must be a focus of the co-creation experience of customers. Accordingly, this research finds it necessary to add this phenomenon (i.e. innovation) to the prevailing 11 FPs of S-D logic theory. Such an addition will allow S-D logic theory to find application in a wider-range of different value co-creation processes across various contexts. Additionally, the researcher finds that the clear presence of value co-creation during interaction, or exchange, that takes place between two actors should be recognised. This will provide a basis for revisiting social exchange theory, which suffers from the limitation that it does not recognise the concept of value co-creation that is inherent to an interaction between two parties involved in a transaction. This constitutes new knowledge.

7.4.4. Ideas Associated with Co-production of Innovation as Value-in-use

Students are partners in the co-production of innovation in HEIs. This has been demonstrated and discussed in the previous sections. Innovation is an integral part of the co-creation experience is an argument put forward by Prahalad and Ramaswamy (2003). However, if there is a case in argument that shows that innovation behaviour could by itself represent a co-creation experience, then the arguments of Prahalad and Ramaswamy need to critically analysed. The reason for such is that when value that is co-created is evaluated by the user of that value and consumed, then that value, if it happens to be a supporting concept to co-creation experience, leads to a new situation that arises whereby that supporting concept gets subsumed into the overall co-creation experience. This duality points to the complex nature of value co-

creation. In such a situation, it is possible to use the concept of value-in-use to explicate how this happens. For instance, one of the students interviewed stated "*we had the entrepreneurship week where I have seen a lot of my friends [participate]. I know them on a personal level, but then I haven't seen them on a professional level. But seeing them bringing their own products, selling them, marketing them and seeing how they have poured their time and energy into their work, opened my eyes, it showed me how different people live their own lives and look for ways to innovate. We also, for example in my marketing course, did go for trips and other activities beyond the classroom. We have visited, for example, the Toyota headquarters, where we gained a lot of rich insights. I think that all helps in innovation.*" This statement amply demonstrates how innovation as an experience is created for students to gain that experience, through site visits prompted by the faculty members. While innovation acts as the stimulant of the co-creation experience, it can be simultaneously evaluated and used by the students to articulate their innovation behaviour. This transformation could only happen if innovation behaviour is built into the students as a co-creation experience. This, by definition, qualifies as a form of value-in-use. This supports the conceptualisation in this research which holds that co-production of value affects value-in-use. These arguments could be extended to similar situations occurring in the classroom where innovation is involved. For example, when students participate in curriculum development, they innovate and co-create value with faculty members. The process of revising the curriculum can be said to constitute a co-creation experience which could be attributed to students' innovation behaviour. Thus, experiencing innovation behaviour becomes value-in-use. This represents new knowledge.

7.4.5. Student Behaviour in the Classroom leading to Innovation Behaviour

As looked at within the confines of lecture halls and classrooms, student behaviour has become an important phenomenon for research on value co-creation. In investigating the concept of developing student innovators in a higher education context, Selznick et al. (2022) suggested that there is a need to consider the role of personality traits in influencing student behaviour, and the outcomes of such, as they believe that developing innovators could depend on those traits. However, in their investigation Selznick et al. (2022) found that personal traits can play a role in innovation, clearly pointing towards innovation capabilities which could be built into students through the concept of connecting experiences. Selznick et al. (2022; p.9) posited "*Our considerations for practice concentrate on connecting experiences (co-curricular experiences) given their magnitude in our multinomial regression analysis. Guidance for contemporary employment of these practices is widespread, often focusing on forms of problem-based learning, collaborative learning, and/or transdisciplinary collaborations that bring students together and integrate their disciplinary insights to address complex societal issues… the pathway to developing innovators over-and-above personality traits or transferring lies in these experiences, they must be actively and intentionally*

promoted through close collaborations between academic, student life, and policy stakeholders." The connecting of experiences and transdisciplinarity of learning are important aspects that students should engage with. There is a need for integration and sustained application of learning across the continuous experiences gained by students in the classroom, extending to co-curricular activities, community engagement, and relationships/friendships that appear to encourage innovation (Selznick et al., 2022). Thus, the finding of this research shows that student behaviour in the classroom, and outside of it, has a significant bearing on innovation. Confirming this, one of the students who was interviewed stated "*I think it [relationship] improves our social skills and human skills because when you will work in a company or institution, you will need to have, aside from your own skills, you need to have human and social skills to interact with people. You need to know how to approach things. You need to know how to communicate with customers and how to create this sort of affection to attract more people.*" Accordingly, it is reasonable to conclude that the innovation behaviour of students needs to be molded in the classroom by teaching faculty. Universities and HEIs must encourage students to learn from real experiences both inside and outside the classroom through engagement with industry experts and exposure to guest speakers. Behavioural aspects like reaching out to experts, companies, or friends, and learning from them how to translate creative ideas into practicable and implementable innovations are critical and must be fostered and developed. Student innovators could be developed in a classroom by fostering the right behaviours that are conducive to innovation. This is an important finding that is derived by this research. Thus, the behaviour of students has an important role to play in the value co-creation process, resulting in such values that could reside in innovation experiences, connecting experiences, and co-creation experiences.

7.4.6. Innovation Competency as a Factor Associated with Innovation Behaviour

The previous section provided arguments for the need to develop student competencies in certain directions to foster and encourage the manifestation of specific behaviours. The classroom is an important setting where such competencies can be developed, before being practiced either within or beyond the classroom confines. Students should be encouraged to reach out to different entities like organisations, industry experts, and peers, to gain exposure that is critical to innovation. This implies that innovation behaviour is a concept that could be inculcated in students both through the classroom experience; through interaction with the faculty members, and by encouraging them to gain connecting experiences. One of the important aspects related to experiences is that such experiences could form experience spaces that enable both interaction and interplay between competence and innovation loci (Prahalad and Ramaswamy, 2003). According to the orthogonal model developed by Prahalad and Ramaswamy, the competence and innovation loci could intersect at such experiential spaces as experience networks, experience personalisation, experience integration, in addition to experience innovation. These experience spaces are

likely to occur at different intersection points when the loci of competence and innovation move along the x and y axes depicted in the model by Prahalad and Ramaswamy. The experience space is found to occupy the arc between two points. The point on the axis labelled as innovation locus is called the experience space, while the point on the axis labelled as competence locus is called enhanced network of competence including consumer communities. Using this model, it is possible to argue that the concept of innovation competency could be considered for analysis and linked to innovation behaviour and the innovation experience of students. Students could gain competencies in a number of ways. One such way could be through universities, which can make a tangible difference by adding value to their students, enhancing students as an operant resource that can contribute to the value co-creation process. Therefore, universities should focus on developing the necessary competencies in students (Velasco, 2014).

Other ways by which students can improve their competencies include personal skills, interpersonal skills, and networking skills, which can ultimately boost their innovating ability (Marín-García et al., 2013). For instance, one faculty member stated that "*At the personal level, engaging with student life in class or outside class which includes extra-curricular activities will create students with greater communication skills and their presentation skills will be higher. How to engage ideas and how to negotiate their ideas.*" The personal dimension, encompassing communication and presentation skills, is recognised as important for students if those students want to develop their creativity and implement the ideas that they generate.

In a similar vein, one alumnus stated "*I think your teamwork and group work is very important and essential. Because if we are talking about innovation that will help us to improve the way we are doing things, it needs to be bounded in a realistic manner and the word realistic is when you work with a group. That is having this teamwork or group work. So, innovation has to be practical, realistic and implementable otherwise there is no value.*" This points towards the need for students to have interpersonal skills. Innovation as a behaviour is more likely to occur in students with better interpersonal skills such as teamwork. It is important to note here that the alumnus is focusing on practical, realistic, and implementable innovation. All these aspects can fall under the category of innovation behaviour, supported by market knowledge competence and transfunctional acclimation.

Furthermore, one student alluded to the importance of networking and interpersonal competency when discussing her own experience with innovation. The student stated: "*So I've been in 2 competitions, one International and one local. The international one is WTUN, which is the World Technology Universities Network. With me was student M and H. I do know them both. So, I told her please come with me. And I know that M, she has a lot of ideas and the competition was about reducing climate change. And she's so*

interested in it and so she brought the idea of this, which led us to 1st place and then H, and so on. So, because we worked as a team, we came in 1st place and then the second competition." This statement points towards the networking dimension as providing a greater chance for students to implement their innovation, especially with combined with teamwork as part of interpersonal skills.

Developing certain competencies and skills in students can lead to specific innovation behaviours. Apart from self-learning through lifelong learning skills, HEIs can motivate students to gain competencies as part of the co-production of innovative behaviour. Coaching and mentoring can be useful in this regard. One faculty member stated "*We're more like in a coaching environment where we all learn from each other and it's based on questioning, questioning things that would tap into people's creative thinking. And this is easier even for me to do because I cover courses that are more qualitative based, such as organization behaviour, business ethics, marketing management and so on. I consider myself as a learner or learning partner to my students. […] I learn what they value and what they need from partnering up with them.*" Through coaching individuals, teams can be formed, allowing for a higher level of faculty-student and student-student interactions. This is conducive for students to co-create value and co-create innovation experience. This empirical finding aligns with similar findings in the literature. For instance, Vargo et al. (2010) argue that the integration of customer competence in co-production of a company's value proposition is important for value creation. Such competency, termed by Amabile (1996) and Penttilä and Kairisto-Mertanene (2012) as innovation competency, is vital for the co-production of value, co-creation of innovation experience, and creation of an experience space for students. This finding recognises the need to link innovation competencies and innovation behaviour. However, it is important to point out that in section 7.2.5, which discussed the hypothesis concerning the relationship between personal dimension and networking dimension on the one hand and individual innovation behaviour on the other, the quantitative data analysis showed that the relationships were not empirically supported. There are contrary findings in the qualitative data analysis. Accordingly, it is difficult to ignore the findings of the qualitative data analysis as the relationship between the personal dimension, networking dimension, and individual innovation behaviour appears to be meaningful and should be recognised.

7.4.7. Student Benefits Accruing through Individual Innovation Behaviour

The literature indicates that benefits accruing out of co-production in HEIs could include student immersion, satisfaction, loyalty, and academic image (Leem, 2021). The term benefit, as related to value co-creation, is defined as value by Vargo and Lusch (2017). Sarmah et al. (2017) claimed involvement in co-creation as a benefit. Bond (2020) referred to improvement in the persistence levels of students as a possible benefit of value co-creation. Bryson (2016) explained described improvement in learning skills as

value co-creation. Many other researchers argued that better opportunities in the labour market are a benefit (Bovill et al., 2011; Bergmark and Westman, 2016; Cavallone et al., 2020; Ruskin and Bilous, 2020; Sanina et al., 2020). Prahalad and Ramaswamy (2004b) argued that risk-benefit leads to value co-creation. These arguments point to a lack of clarity as to what could constitute benefit or value. In another instance, value-in-use was considered as closely associated with benefit. For instance, Leem (2021) argued that value-in-use leads to student benefit. He also argued that co-production leads to student benefits as well. In a similar vein, Dollinger et al. (2018) described value-in-use as the experience a customer gains, which can be construed as a benefit. These arguments clearly illustrate the lack of consensus in understanding whether benefit is value, or value leads to benefit, or value-in-use is benefit, or whether benefit could be co-produced. As part of the final analysis, this research concludes that individual innovation behaviour, innovation competency, and the related innovation experience/co-creation experience work in tandem to produce student benefits as part of the wider value co-creation process. However, this could not be clearly established through the qualitative phase of the study (refer to table 6.7), given that interviewees only alluded to benefits in an indirect way. Examples of individual innovation behaviour producing student benefits are found to occur when students graduate. This occurs when they employ the innovation co-creation experience they gained in the university, in their work place. For instance, one alumnus stated "*Going back to my definition of innovation, it is creativity and initiative or driving motivation. […] But you can teach how to implement it and how to materialize your ambitions, so that I learnt. How to make it into reality which are the concepts of multiple courses across my whole degree.*"

As an important and novel finding, it is possible to argue that this research acts as an important example of an empirical study that demonstrates how student benefits can be co-produced by developing innovation behaviour in students as part of the co-creation experience of students. However, in order to develop innovation behaviour in students, it is necessary that faculty members encourage students to learn innovation competency skills through interdisciplinary learning. The values that students can co-produce through innovation will offer many benefits in terms of satisfaction or immersion to the students. Additionally, it is important for the teaching faculty to emphasise the practical utilisation (i.e. consumption) of the value co-created. However, it is acknowledged that this may not always occur in a meaningful way; not until after students have graduated and entered the workforce. For instance, the employability of students could be a straightforward student benefit that would accrue through innovation behaviour and innovation experience. Accordingly, this research adds to the body of knowledge concerning innovation behaviour developed in the university as a co-created experience.

Based on the preceding discussion, it is evidenced how the outcome of the qualitative study has supported the conceptualisation of the seven constructs deployed in the theoretical framework (figure 3.1) and the eight hypothesised relationships. The outcomes have also shown that the lack of statistical significance that resulted through the analysis of the quantitative data can be countered. The relationships co-production → student benefits, value-in-use → student benefits, personal dimension → individual innovation behaviour, and networking dimension → individual innovation behaviour, which were not supported in the quantitative data analysis phase, were found to be supported through the qualitative data analysis phase. The contradictory situation that has arisen could be investigated in future research to discern whether the lack of support to the four relationships mentioned above could be contextual or otherwise. There may be other additional concepts that need to be introduced to test the rejected hypotheses afresh. Furthermore, the qualitative data analysis phase has produced other themes that have the potential to be given shape as theoretical constructs. These include:

- Intrinsic factors: Sub-themes generated were intrinsic motivation, personal dimension, interpersonal dimension and networking dimension.
- Extrinsic factors: Sub-themes generated were extrinsic motivation and space.
- Auxiliary innovation skills: Sub-themes generated were market knowledge competence, lifelong learning and transfunctional acclimation.

The intrinsic factors can become theoretical constructs that could be tested in future research as important co-creation factors in the context of a classroom setting, with a focus on innovation behaviour. The sub-themes could act as the first order constructs that measure the intrinsic factors as second order constructs. The same arguments could be extended to the extrinsic factors and auxiliary innovation skills of students.

7.5. Answering the Research Questions
7.5.1. Research question 1 (RQ1): What factors contribute to the value co-creation process in a higher education institution during classroom interaction between instructors and students that support students to innovate/invent and how are they related to each other?

The research outcomes of the quantitative data analysis show that the factors that contribute to value co-creation in a classroom setting in a higher education context are six in number. These are co-production, value-in-use, innovation competency (personal, interpersonal, and networking dimensions), and individual innovation behaviour. This is evidenced by table 5.28 where the results of the hypotheses testing are tabulated. However, the qualitative data analysis showed that additional factors could contribute to the value co-creation concept which include two additional innovation competency components, namely, the

personal dimension and the networking dimension, other intrinsic factors, extrinsic factors, and additional factors that need to be considered while dealing with innovation. These factors emerged from the thematic analysis. The details are tabulated in table 7.3.

#	Factors conceived in the theoretical model as contributors to value co-creation	Factors that emerged as valid contributors to value co-creation through the quantitative data analysis	Factors that emerged as valid contributors to value co-creation through the qualitative data analysis (second order)	Factors that emerged as valid contributors to value co-creation through the qualitative data analysis (first order)
1.	Co-production	Co-production	Co-production	Knowledge sharing, equity, interaction
2.	Value-in-use	Value-in-use	Value-in-use	Personalisation, experience, relationship
3.	Personal dimension	-----	Intrinsic factors	Intrinsic motivation, personal dimension, interpersonal dimension, networking dimension
4.	Interpersonal dimension	Interpersonal dimension	Extrinsic factors	Extrinsic motivation, space
5.	Networking dimension	-----	Auxiliary innovation skills	Marketing knowledge competence, lifelong learning, transfunctional acclimation
6.	Individual innovatioin behaviour	Individual innovation behaviour	-----	-----

Table 7.3: Factors contributing to the value co-creation process focused on innovation in HEIs

All the factors that contribute to the value co-creation process in a higher education institution, that support students to innovate/invent, were linked to the innovation behaviour as a student benefit, to test the co-creation of value.

With regard to the interrelationship between the factors, the factor co-production has a direct and positive effect on value-in-use and individual innovation behaviour. This has been explained in section 7.2.3. Furthermore, co-production has no direct relationship on student benefits, which

implies that there could be a mediating factor, or factors, in the relationship. Individual innovation behaviour acts as the mediating factor between co-production and student benefits, whereas value-in-use was not found to mediate between co-production and student benefits (section 7.2.3)

As for the innovation competency factors, only the interpersonal dimension was found to have direct and positive effect on individual innovation behaviour. It has a larger effect on individual innovation behaviour when compared to the co-production effect. This is a new finding, which contributes to body of knowledge on value co-creation.

This research finds that it is possible to propose a relationship between additional factors that were extracted through the thematic analysis. These additional factors could potentially act as independent variables that contribute to the value co-creation process in a classroom setting. This could be investigated in future studies. During the qualitative data analysis phase, intrinsic factors and extrinsic factors emerged as potential independent second order constructs. These factors could be directly related to both innovation competency and individual innovation behaviour. It is also possible that the factors, namely, intrinsic motivation, personal dimension, interpersonal dimension and networking dimension, could be configured as potential first order constructs that measure intrinsic factors. In this case, the three factors personal dimension, interpersonal dimension, and networking dimension, defined as innovation competency constructs, could be conceived as a single construct. This implies that intrinsic factors can potentially be measured by two first order constructs, namely, intrinsic motivation and innovation competency. This is a new way of configuring factors that can contribute to value co-creation in a classroom setting. Understanding these factors could provide a method for dealing with the value co-creation process in a classroom within a university setting through strategies that benefit students as well as the institution. The thematic analysis also produced extrinsic factors, which could be represented as an independent variable affecting individual innovation behaviour. Extrinsic factors can be measured by two first order constructs, namely, extrinsic motivation, and space. Finally, individual innovation behaviour, which has been conceived as a mediating factor in this research, was also found to have the potential to be treated as a second order construct. The three factors marketing knowledge competence, lifelong learning, and transfunctional acclimation could act as the first order constructs and conceived as auxiliary innovation skills. This is a new finding. Based on the preceding discussions, the researcher is able to conclude that research question RQ1 has been answered in a comprehensive fashion.

7.5.2. Research question 2 (RQ2): What is the nature of the values co-created and how do they occur during the value co-creation process in a classroom?

The values co-created in the classroom setting were found to be tangible and intangible in nature. Those values that were found to be normally tangible were the actual innovation, or inventions, produced by the students. These innovations could be products or services which could be consumed by the innovating students themselves, or other students at a later stage. For instance, a co-produced curriculum can be considered a tangible example of a co-created value by the students. Intangible value could include the co-creation experience itself, the development and manifestation of innovation behaviour, student satisfaction, immersion, employability, and enhanced innovation competency skills.

With respect to the second part of the question concerning how value co-creation occurs, this research demonstrates that value co-creation can occur in different ways. The main way - as relevant to the scope of this study - by which value co-creation can occur is through the process of teaching and learning. During this process, it is argued that when a student becomes an active learner, he/she will engage in generating and contributing new ideas, through sharing his/her own experiences, knowledge, and skills. Learners will integrate their input, affecting and shaping the teaching and learning process. This means the classes will run not as one way communication but through a two-way communication process, where students are empowered as active learners that are responsible for their own individual learning and value creation. In such a situation, it is possible to expect professors to act as leaders and facilitators of discussions and learning. Professors could play a mentoring role. This is of critical importance. This is one example of a process that emerged as occurring in the classroom through the qualitative data analysis phase. Additional ways that demonstrate how the value co-creation occurs could include coaching of students, providing internship, training to communicate ideas, encouragement of idea generation, encouragement of peer interaction, peer tutoring, and teamwork. Universities should provide resources and space (e.g. time, physical and online platforms) that would enable students to develop and exchange new ideas. Universities should also provide opportunities and channels for networking, building interpersonal skills, through co-curricular and extra-curricular activities that create opportunities to innovate. Further opportunities that are available to stimulate co-creation experience in a classroom setting include creating innovation experience spaces, enhancing both intrinsic and extrinsic motivation, which could be done through gamification of teaching and learning (refer to extrinsic motivation – faculty 1 statement in table 6.7). Universities should support the innovation capabilities of students through connecting experiences, problem-based learning, collaborative learning, and/or transdisciplinary collaborations that bring students together. Students should be encouraged to integrate their disciplinary insights to address complex societal issues through close collaborations between academics, students, and other stakeholders.

Furthermore, the co-innovation competency, referred to earlier, is a novel finding that is particularly meaningful to the higher education context. The findings of this research demonstrate the importance of innovation competency as an important independent variable in the value co-creation process. In practical terms, students will enter into a classroom with a certain level of competency. The covariance that exists between such competency and co-production suggests that the competency represents a factor that affects the student's capability to co-produce. In other words, the level of co-production will be affected by the competency, especially within the context of innovation or as related to individual innovation behaviour. Equally important is the effect of co-production on the innovation competency, whereby, the co-production of teaching and learning, leading to individual innovation behaviour, will arguably enhance the student's competency. This would be in line with the mission and objectives of any HEI in today's higher education landscape, where the development and enhancement of a range of student competencies is considered critical to the success of the institution, towards enhancing student employability and graduate capabilities. Based on the preceding discussions, it can be concluded that research question RQ2 has been answered.

7.5.3. Research question 3 (RQ2): Are there levels under which students could be classified and engaged to innovate as part of the value co-creation process, and if so, how to classify the students according to different levels?

The question "Are there levels under which students could be classified and engaged to innovate as part of the value co-creation process?" could be answered as follows. This research posed a question to students who participated in the survey regarding the level of interest that they have with respect to innovation. Three options were given, namely, fully interested, partially interested, and not interested. A majority of students (51.8%) responded by expressing that they are fully interested in participating in innovation, whereas 38.4% expressed partial interest only. A meagre 6.6% expressed that they are not interested in participating in innovation activities. This finding empirically demonstrates the presence of levels of interest exhibited by students with regard to participation in innovation. A similar, yet longitudinal, study was conducted by Selznick et al. (2022) who studied students as innovators, taking four different levels which were identified as the first year, second year, third year, and fourth year levels. That level of interest could matter in value co-creation. Additionally, although Brambilla (2016) alludes to levels, however, innovation was not the concern of her study on value co-creation. As such, the finding of this research constitutes new knowledge.

Pini (2009; p.61) explains that there is a lack of studies that have examined the level of consumer interest and involvement in the process of value co-creation. This is particularly true in the academic context where

discussions on value co-creation are on the rise. This argument could be extended to the level of students' interest and involvement in the process of innovation. One reason why the level of interest in innovation amongst students should be considered as important is the fact that it could be linked to the perceived learning levels. Perceived learning levels are found to be associated with value co-creation in the literature. In other words, value co-creation and students' level of interest in innovation can be linked through perceived learning levels (Brambilla, 2016). However, available models that have empirically tested the linkage between perceived levels of learning and level of student interest in innovation are scarce in the literature. The results of this research provide evidence to suggest the possible existence of a relationship between perceived levels of interest of innovation and learning.

Abrantes et al. (2007) argued that perceived learning is associated with the perceived performance of a student. An example of perceived learning could be acquiring knowledge (Barbera et al, 2013). Furthermore, perceived level of learning is related to several outcomes emanating from the classroom learning process and actions including skills, knowledge assessment, and self-assessment. This in turn is argued as being important for generating greater desire in students to learn (Brambilla, 2016). Passion and desire are amongst the frequently used terms that appeared in the interviews, where participants stressed on the importance of passion, enjoyment, and desire as part of the intrinsic factors that are critical to innovation. The desire to learn could also imply lifelong learning. Thus, the perceived level of learning performance could be thought of as the reason for generating interest in students to learn, leading to perceived levels of quality of learning performance. The desire to learn, thus, becomes an important factor that drives students to perform in the classroom. Accordingly, it is plausible that students could have different levels of interest depending on their ability to interact. Hence, it can be concluded that the levels of interest could be an important factor that drives students to gain knowledge and skills in the classroom, which in turn represent important ingredients that are linked to the concept of innovation.

As for the question "how to classify the students according to different levels?" it is possible to answer this giving the example of the survey results. The survey asked students about three demographic factors, namely, gender, level of interest to participate in innovation, and the academic programme in which the participants were enrolled at the undergraduate level. Students can be classified in small groups based on their level of interest, cutting across the different programmes in which they are enrolled. This classification provides the resources for students to work in an interdisciplinary (transfunctional) way with respect to innovation. This is one way of classifying students. There could also be gender specific groups that could be created where cultural particularities dictate gender considerations. Finally, other methods could be innovatively produced by the faculty members to classify students based on the contingencies of their

department, college, and areas of research interest. Thus, it can be concluded that research question RQ3 has been addressed.

7.6. Chapter Conclusion

This chapter discussed the entirety of findings produced by this research, as derived through the quantitative and qualitative data analyses provided in chapters five and six. Several potential discoveries have been highlighted. The discussions have provided clear indications of contribution to knowledge, theory, policy and practice. Hence, this chapter provides the basis for proceeding to the conclusions part of this research in the final chapter of this thesis.

Chapter 8 – Conclusion

8.1. Chapter Introduction

This chapter sifts through the gaps identified in this research and the discussions that have interpreted the findings towards producing conclusions. The chapter explains how the gaps have been addressed by providing the various contributions this thesis has made to knowledge, theory, policy, and practice. Additionally, the chapter highlights a number of limitations that could have affected the research, and accordingly suggests potential areas for future research.

This thesis articulated an aim in chapter 1, which states "Development of a theoretical model that demonstrates value co-creation in a classroom setting in a higher education context with a focus on innovation." This aim provides both the basis for the research questions, and the purpose in answering them. In answering the research questions, a theoretical model was developed using various components that were found to be associated with the concept of value co-creation. This was done through a thorough, critical, and comprehensive review of the literature. The model was developed based on sound theories that have been established by various authors through conceptual and empirical studies. The model was conceived with a focus on students' innovation behaviour as a value co-produced inside the classroom. The model was tested using a mixed method approach. Analysis of the data collected through the quantitative and qualitative methods produced the findings. Discussions on the findings illustrate that the model has demonstrated the occurrence of value co-creation as a phenomenon in the classroom. Furthermore, it demonstrated the role of innovation competency in developing individual innovation behaviour in students. In achieving the aim, the researcher sought to demonstrate the benefits that students can derive from the value-co-creation process in HEIs which offer certain value propositions and resources. In addition to the resources that a university provides, the students themselves are considered as operant resources that contribute their own knowledge and skills as resources. Thus, the testing of the model showed that value can indeed be co-created in a classroom setting through the interactions of faculty and students. Faculty can be considered as service providers, and students as receivers and consumers of that service. The extended nature of the service delivery that is particular to the higher education context is seen to offer fertile ground for value co-creation and the co-production of innovation behaviour. Therefore, it was concluded that the aim was achieved.

8.2. Contribution to Knowledge

This research makes a number of contributions to the body of knowledge related to value co-creation. An important gap identified in the literature was the lack of knowledge as to whether co-creation occurs in a

classroom setting in a higher education context. This aspect was studied with a focus on co-production of innovation in the classroom. To ascertain this, the researcher identified four important components that are purported to contribute to value co-creation. Those four components were as follows:

1. There is a minimum of two actors as part of any transaction and economic exchange activity;
2. There is an interaction between the two, with one providing the service as the benefactor and the other receiving the service as the main beneficiary;
3. There must be some value proposition that is offered for consumption;
4. There should be resources available to integrate in order for value co-creation to occur.

This argument is supported by S-D logic theory. Accordingly, it follows that in a classroom, there are two actors at least; one is the faculty and the other is the student. Moreover, there should be an interaction between the faculty, as a service provider, and the student, as the service receiver (Hu et al., 2023). A process of teaching and learning unfolds, hence, an interaction between the faculty and student is inevitable. As for the value propositions, faculty members will translate the university value propositions by raising a number of issues relevant to their particular course/subject. Faculty are expected to generate problems and foster conditions that could lead to potential discovery by students. For instance, assignments on case studies or the gamification of the teaching and learning process can both potentially stimulate innovation. Finally, resources required for value creation are expected to be provided by faculty as important inputs (e.g. knowledge and skills of the faculty members). Accordingly, the presence of conducive conditions that enable the occurrence of value co-creation can be said to be present in a classroom setting. This research demonstrated the existence of the above components in a classroom setting in a higher education institution that comprises several colleges. As such, the basic conditions for value co-creation are present.

The integration of those components required for value co-creation in the classrooms was found to be present in the institution in which the research was conducted. In order to ascertain and assess that value co-creation indeed occurs in the classroom, the researcher conducted a survey, and semi-structured interviews. Both quantitative and qualitative data were collected to test the theoretical model. The experiment conducted showed that value co-production, as an independent variable, affects value-in-use, as a dependent variable. Furthermore, this research found that co-production influences individual innovation behaviour. Further still, this research corroborated the postulation that co-production, value-in-use, and innovation space, are all components that indicate the occurrence of value co-creation. This directly aligns with previous studies and is well established in the literature (Prahalad and Ramaswamy, 2003; Vargo and Lusch, 2004). The results of the experiment conducted in this research confirmed that value is co-produced as part of the wider co-creation process inside the classroom. This occurs through the

interaction that takes place during the teaching and learning process between the faculty member and students. Again, this confirms that value co-creation occurs inside the classroom setting in a higher education context. This finding adds to the body of value co-creation knowledge and confirms the findings that value co-creation could occur inside a classroom setting (Dollinger et al., 2018; Leem, 2021).

Several values are purportedly produced as part of the co-creation process in a classroom setting. Tables 2.4 and 2.5 provide examples of values that are identified by various researchers as being potentially produced in an educational setting (Zarandi et al., 2022). Further values have been identified by other researchers as occurring in an educational setting. The literature discusses functional value, social value, emotional value, epistemic value, conditional value, value-in-use, and transactional value (nominal value) (table 2.3). However, the individual innovation behaviour of students in a classroom setting has not been investigated as a value co-created in a classroom setting (Nguyen et al., 2021). Ramaswamy and Ozcan (2014) posited that co-production could lead to the development of innovation behaviour in customers. Nonetheless, it is hard to come by any conceptualisations in the literature that link innovation behaviour to student benefits. This is a clear gap in the literature. This research addresses this gap. The relationship established between co-production and individual innovation behaviour implies that students will use innovation behaviour to implement innovations. Additionally, the literature indicates that implementation of innovation is innovation behaviour (Lukes and Stephan, 2017). This research found that there is a positive and direct influence of co-production on individual innovation behaviour. This implies that the outcome of this research has filled the gap in the literature by introducing individual innovation behaviour as a co-produced value. The individual innovation behaviour is also considered as a co-creation experience of the students that leads to implementation of innovation. This research outcome demonstrates that innovation behaviour is co-produced as part of the co-creation experience of students in a classroom setting. This is a contribution to knowledge. This new knowledge can be useful to faculty members, students, and higher education institutions in general. This is especially relevant to HEIs that count innovation as a core value. This finding can help HEIs optimise the value co-creation process by focusing on students' innovation competence and innovation behaviour to generate synergistic and mutually beneficial outcomes.

Another important aspect addressed by this research is the generation of value-in-use, through the co-produced innovation behaviour. The results of this research point towards co-produced innovation behaviour being potentially consumed in such a way that can lead to value-in-use. This is a new finding. The challenge here was the lack of clarity as to whether it is possible, within the confines of the classroom, to build innovation behaviour in students; and if so, whether such a behaviour could be perceived as value, and hence considered by the students for their future use. The results of this research suggest that innovation

behaviour can be considered a co-created experience that could be produced in the classroom and built in students. Furthermore, that experience will be in the memory of students for a long time, hence, it could be used by those students at a later date as value-in-use that manifests after graduation. This is new knowledge that is not reported in the literature.

Another important gap that was identified in the literature is the utility of innovation competency in supporting the individual innovation behaviour of students, and its association to the construct co-production. Innovation competency skills are seen in the literature as skills that can be built into students (Marín-García et al., 2013). However, Marín-García et al. (2013) did not highlight the possibility of using those skills to co-produce the co-creation experience of students in the classroom as part of the innovation process. This research demonstrated that the association of the three innovation competency skills, namely, the personal dimension, the interpersonal dimension, and the networking dimension, with co-production can contribute to generating individual innovation behaviour and value-in-use. This is another contribution of this research to knowledge, as no such postulation could be found in extant literature. This research terms the association of co-production and the innovation competency constructs under the name "co-innovation competency." This term can imply that innovation behaviour and value-in-use can be co-produced in a classroom if the students are trained to gain the requisite innovation competency skills. In doing so, HEIs can optimise the value co-creation process. Additionally, the co-created innovation behaviour is termed as innovation experience based on the arguments of Prahalad and Ramaswamy (2003). This constitutes new knowledge.

An important discovery made here is the generation and classification of the factors using the findings of the qualitative data analysis. Section 6.9 shows that a new set of first order and second order constructs are part of the co-creation experience gained by students in a classroom. The discovery of second order constructs namely intrinsic factors, extrinsic factors, and auxiliary innovation skills, and a host of first order factors that could be used to measure them is new knowledge produced by this research. This contributes to the body of knowledge on the topics value co-creation and innovation.

8.3. Contribution to Theory

This research makes a few theoretical contributions to the value co-creation domain. Foremost, this research challenges the S-D logic theory in a limited way. Table 2.8 illustrates that the eleven FPs of the S-D logic theory do not make any reference to innovation as a fundamental building block that is needed for co-creation. The fundamental nature of innovation was demonstrated in this research, as innovation is critical and cannot be ignored when value is being co-created by the customer. This argument is supported by

Prahalad and Ramaswamy (2003), although their argument was just a statement that was not empirically tested. Thus, the researcher suggests that a twelfth (12th) foundational premise should added to the eleven FPs finalised by Vargo and Lusch (2016). Accordingly, FP12 could be articulated as follows: Innovation is a fundamental building block of the value co-creation process. This implies that value co-creation cannot occur in the absence of innovation.

The next theoretical contribution this research makes relates to the orthogonal model developed by Prahalad and Ramaswamy (figure 7.1). In the experience space, one of the competency components, namely interpersonal experience is missing. While developing the coordinates to relate the loci of innovation and competence, the experience space needs to include experience interpersonal relations. This would be consistent with the INCODE barometer measuring instrument developed by Marín-García et al. (2013) and the innovation competency model postulated by Amabile (1996). Thus, the researcher suggests that this modification be incorporated in the model developed by Prahalad and Ramaswamy (2003). The suggested revised model is presented in figure 8.1.
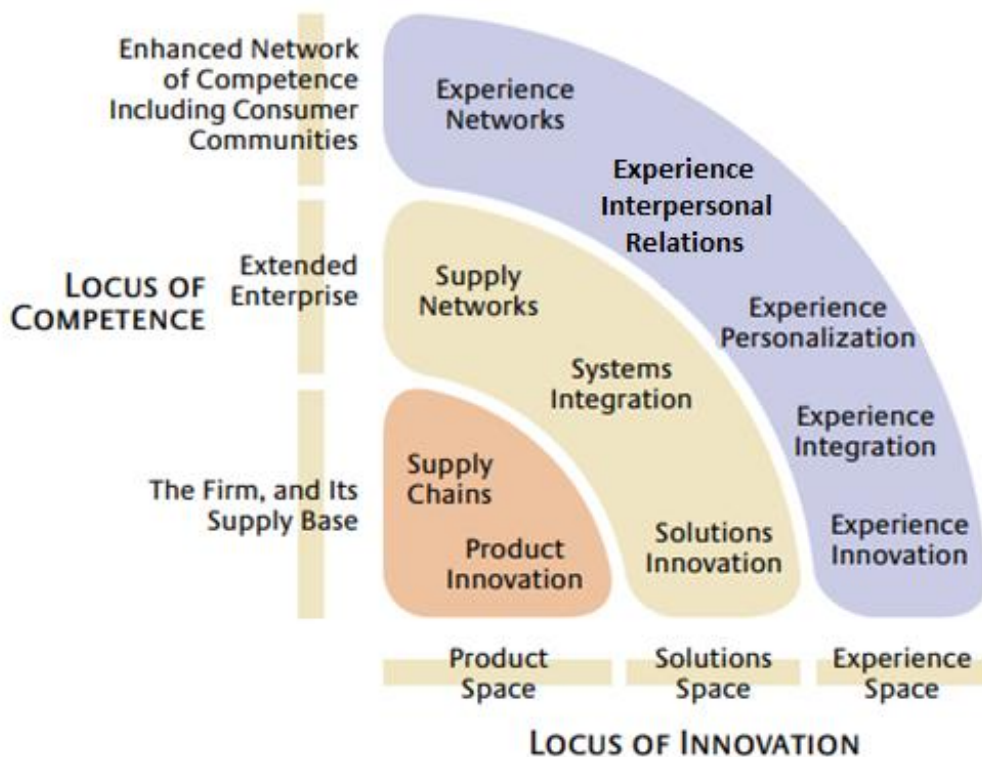

Figure 8.1: Suggested revised model of Prahalad and Ramaswamy

Another important aspect of the theoretical contribution is that this research finds it necessary to challenge the social exchange theory partially, insofar as the theory has to include the concept of value co-creation in the exchange process between two actors. The discrete view of exchange is inconsistent with the dynamic, recursive, and iterative nature of value co-creation. When the limitations of applying social exchange theory are considered, the explanatory power of the theory becomes suspect (Davlembayeva and Alamanos, 2023). Consequently, it becomes evident that while social exchange theory is applied by many researchers in the explication of value co-creation (Lee and van Dolen, 2015; Breidbach and Maglio, 2016; Lin et al., 2017) critics of social exchange theory argue that the lack of clarity and precision in defining the constructs involved in social exchange make it not possible to be used across disciplines. This limitation renders the application of social exchange theory in investigations concerning value co-creation vulnerable to questions being raised as to the validity of the outcomes of those investigations. However, this research has demonstrated that social exchange theory, in conjunction with S-D logic theory, could explain the value co-creation process. In the absence of the support of a theory like social exchange theory, it becomes imperative on the part of the researchers to assume that S-D logic theory implies the meaning of the exchange processes that takes place between actors. However, such an assumption is prone to errors as exchange processes may not always co-create value. For instance, the lack of recognition of the potential negative effects of co-creation (Plé and Cáceres, 2010; Echeverri and Skålén, 2011) and the lack of consideration of other stakeholders (Hsieh and Chen, 2016; Hsu et al., 2021) may require the application of social exchange theory. In such a scenario, social exchange theory may provide adequate explanatory power to account for the negative effects that could be generated through the value co-creation process. Thus, this research has combined the social exchange theory and S-D logic theory in operationalising the relationship between constructs, for instance, between co-production and value-in-use. This is an important theoretical contribution made by this research. Furthermore, this research directly challenges the following postulations of Penttilä et al. (2011; 2012) depicted in figure 2.5. The figure shows a non-linear operation of the three innovation competency dimensions, namely, the personal, interpersonal, and networking dimensions. However, the result of this research and the outcomes of the empirical research of Marín-García et al. (2013) clearly indicate a linear relationship between the three innovation competency constituent components and innovation behaviour. Consequently, the researcher posits that the conceptualisation of innovation as a function of the product of the three innovation competency factors, as proffered by Penttilä et al. (2011; 2012), needs to be revisited and revised. For instance, with regard to the value co-creation process in the classroom, it is worthwhile to consider the algebraic sum of the effects of the three innovation competency factors in place of the product. This could provide avenues to explain the occurrence of the innovation behaviour caused by the additive nature of the effect of the three innovation competencies.

Lastly, this research is able to expand the application of many theories in conjunction with S-D logic theory, as the dominant theory used in this research. Hence, this research has demonstrated how a combination of theories can work in tandem to supplement and compensate for the limitation of other theories to explain a specific operation in a complex value co-creating environment by developing a new conceptual model that was empirically tested.

8.4. Contribution to Policy

Hoidn and Kärkkäinen (2014) highlighted the fact that future innovation, social progress and growth require people who are skilled. The global innovation index reveals that Bahrain has underperformed in the area of innovation, specifically with regard to transforming inputs to innovation outputs. In 2023, Bahrain ranked 67th out of 132 economies according to the index (WIPO, 2023). The importance of innovation is beyond debate. With a focus on innovation, many countries, from Australia to Ireland, have launched initiatives in terms of formulating national innovation/skills strategies (Expert Group on Future Skills Needs, 2007; Commonwealth of Australia, 2009). Crosier et al. (2007) point out that there is more and more attention being paid to student-centred learning pedagogies in place of the traditional instructor-driven provision in Europe. In fact, the European Commission (2010) has promoted transversal key competencies for all citizens. They emphasised the need for cooperation in education and training among European countries with an aim of achieving higher levels of creativity, innovation, and entrepreneurship. In the case of Bahrain, where this study was undertaken, the Economic Vision 2030 – launched 15 years ago – spelled out three guiding principles within the vision. The vision document highlighted fairness, sustainability, and competitiveness as three important pillars for the socio-economic transformation of the Kingdom. Both sustainability and competitiveness hinge on the ability to innovate. Accordingly, the research outcomes of this thesis provide novel insights useful to policy makers at both HEIs and at the level of regulators and governments alike.

While innovation and innovation behaviour are central to this thesis, the main binding concept that is used in this research is that of value co-creation. Co-creation processes can empower HEIs to inculcate innovation behaviour in students. The results of this research clearly highlight the importance of value co-creation, which is not (yet) in the agenda of most HEIs. Furthermore, the results also point out the need for encouraging value creation, value co-creation, and innovation in general. Further still, the results impress upon the need for educational institutions to focus on innovation competencies in order to optimise the value co-creation process. A focus on innovation competencies is necessary for students to meaningfully engage in the value co-creation process towards achieving mutually beneficial and synergistic outcomes.

Students can drive innovation for both their own benefit, and the benefit of the wider community. Moreover, the innovation experience gained by students can be beneficial in terms of improved employment prospects, and enhanced graduate capabilities. Higher education institutions therefore have a duty to promote value co-creation processes, starting with classroom-based teaching-learning.

As far as policy makers in the government and other organisations, the outcomes of this research provide enormous potential in terms of aiding in the crafting of policies that could help students gain the necessary skills and knowledge by focusing on the process of value co-creation. The policies that need to be promoted by the various countries in this regard must encourage and incentivise HEIs to focus on innovation and skill development in students. Such skill development is expected to benefit the society as well as industry in general. The concept of value co-creation provides tremendous opportunity for policy makers to consider inclusion of value co-creation as part of curricula at HEIs. Furthermore, policy makers can consider the need to encourage industries to collaborate more closely with universities and students with the aim to foster value co-creation conditions, which can also support the manifestation of the triple (or quadruple) helix model of innovation on a national level.

8.5. Contribution to Practice

This research makes a few contributions to practice. Firstly, the outcome of this research can be applied to HEIs across contexts, which will help those institutions to approach the value co-creation concept more seriously and methodically to encourage students to contribute to innovation. Secondly, this research will be usefully applied to benefit students and produce innovation experience. Such experience generates value that could be useful to students over a period of time. Thirdly, HEIs could benefit immensely if they apply the concepts dealt with in this research, towards gaining competitive advantage. Students' innovation competency, satisfaction, loyalty, immersion, and innovation experience can all be enhanced. Fourthly, the outcome of this research could be useful to policy makers in the higher education sector by encouraging them to focus on, and adopt, value co-creation, as a strategic concern. This could spur a new chapter in those institutions as the concept of value co-creation is still new to the higher education sectors.

8.6. Limitations of this Research

This research suffers from a few limitations. The study identified co-production as one of the independent variables. The assumption here is that the operationalisation of the construct co-production is introduced at the stage of an interaction between the faculty and students in a classroom setting in a higher education context. This implies that the antecedents that may exist and contribute to the occurrence of co-production have not been considered. For instance, student perceived benefits, knowledge sharing, equity and

information-based tools could act as antecedents. Similarly, with regard to the dependent variable, student benefits may have a lack of distinction with the concept of value as benefits are sometimes considered to be values. This implies that student benefits, as a value, is co-created by another co-created value, namely, individual innovation behaviour. This anomalous situation may need to be looked at by including other factors, for instance, value-in-use as the dependent variable. In addition, this research has not considered sustainability, environmental, and cultural factors that could contribute to the value co-creation process in a classroom. Consideration of such factors could enhance the innovation experience and desire of students to innovate, and ultimately develop their innovation behaviour.

Moreover, this research was conducted during the prevalence of the COVID-19 pandemic. The student population characteristics were not homogenous as some of the students who participated in the research were first timers with regard to post-secondary face-to-face teaching and learning. Other students had experience of both the online and classroom-based face-to-face teaching and learning. This is especially significant given some of the important concepts that were studied in this research, for instance, interpersonal and networking competency skills. Students' interpersonal and networking skills may have suffered and experience stunted development during the lockdown phases of the pandemic. Thus, there could be some variance in the understanding of the participants with regard to the typical interaction that takes place inside a classroom at a post-secondary level. This points to the possible inconsistency in the results achieved, due to a lack of homogeneity in student characteristics. Finally, this research may have benefitted if there was a longitudinal study that takes into account the levels of the students vis-à-vis their year of study. The current research involved students from all levels, randomly. Segmenting the students could yield interesting results.

8.7. Recommendations for Future Research

This research recommends a number of avenues for further research. Future research may include some of the antecedents of co-production not included in this study to examine the model afresh. For instance, knowledge sharing, student perceived benefits, and information-based tools could act as antecedents of co-production, either as a first order constructs to co-production, or determinants of co-production. Secondly, this research has produced a host of factors as affecting the innovation experience and co-creation experience of students. For instance, intrinsic factors (e.g. intrinsic motivation), extrinsic factors (e.g. extrinsic motivation and experience space) and auxiliary innovation skills (e.g. Marketing knowledge competence, lifelong learning, and transfunctional acclimation) could be considered in future quantitative studies as factors affecting value co-creation and innovation behaviour.

This research was conducted on a cross-sectional time horizon. Future research could consider conducting a longitudinal study which may produce different results. Additionally, the outcome of this research offers researchers new avenues to investigate. For instance, the outcome of the research could be used to investigate the concept of co-innovation competency, newly coined in this research, as a single construct in research concerned with value co-creation. The concepts of this research could be further applied to other contexts, including other countries, and cultures, to further corroborate the validity of this research. Finally, future researchers could consider applying other mixed method research methodologies, such as the exploratory sequential mixed method research design to test the generalisability of the outcomes of this research.

References

Abramson, R., Rahman, S. and Buckley, P., (2005) 'Tricks and Traps in Structural Equation Modelling: a GEM Australia Example Using AMOS Graphics', *Paper presented at the Australasian Business and Behavioural Sciences Association Conference,* Cairns, Australia August 5-7, 2005.

Abrantes, J.L., Seabra, C. and Lages, L.F., (2007) 'Pedagogical affect, student interest, and learning performance', *Journal of Business Research*, 60(9), pp.960-964.

Acar, O.A., Tarakci, M. and Van Knippenberg, D., (2019) 'Creativity and innovation under constraints: A cross-disciplinary integrative review', *Journal of Management*, 45(1), pp.96-121.

Achcaoucaou, F., Guitart-Tarrés, L., Miravitlles-Matamoros, P., Núñez-Carballosa, A., Bernardo, M. and Bikfalvi, A., (2014) 'Competence assessment in higher education: A dynamic approach', *Human Factors and Ergonomics in Manufacturing & Service Industries*, 24(4), pp.454-467.

Adler, P.S. and Kwon, S.W., (2002) 'Social capital: Prospects for a new concept', *Academy of Management Review*, 27(1), pp.17-40.

Ahmad, N., (2016) 'The way forward. Customer co-production behaviour', *Procedia-Social and Behavioral Sciences*, 224, pp.238-245.

Ahn, M.Y. and Davis, H.H., (2020) 'Sense of belonging as an indicator of social capital', *International Journal of Sociology and Social Policy*, 40(7/8), pp.627-642.

Alam, I., (2006) 'Removing the Fuzziness from the Fuzzy Front-End of Service Innovations Through Consumer Interactions', *Industrial Marketing Management*, (35), pp.468–480.

Alford, J., (2002) 'Why do public-sector clients coproduce? Toward a contingency theory', *Administration & Society*, 34(1), pp.32-56.

Almeida, A.J.D., Bíró, B., and Teodósio, A.D.S.D.S, (2022) 'Creating value for sustainability: An analysis of the applied use of stakeholder theory', *Encontro Internacional sobre Gestão Empresarial e Meio Ambiente.*

Al-shami, S.A., Rashid, N. and Cheong, C.B., (2023) 'Happiness at workplace on innovative work behaviour and organisation citizenship behaviour through moderating effect of innovative behaviour', *Heliyon*.

Amabile, T.M., (1988) 'A model of creativity and innovation in organizations', *Research in Organizational Behavior*, 10(1), pp.123-167.

Amabile, T.M., (1996) *Creativity in context*. Westview press.

Amabile, T.M., (2018) *Creativity in context: Update to the social psychology of creativity*. Routledge.

Ambad, S.N.A. and Wahab, K.A., (2016) 'The relationship between corporate entrepreneurship and firm performance: evidence from Malaysian large companies', *International Journal of Business and Society*, 17(2), pp.259-280.

Amstrong, M., (2008) *Strategic human resource management: A guide to action.* London, GBR: Kogan Page Ltd, 248.

Anderson, N., Potočnik, K., and Zhou, J. (2014) 'Innovation and creativity in organizations a state-of-the-science review, prospective commentary, and guiding framework', *Journal of Management*, 40(5), pp.1297–1333.

Andreu-Andrés, M.Á., Marín-García, J.A. and García-Carbonell, A., (2017) 'El Barómetro INCODE como herramienta de autoevaluación de las competencias de innovación', *REDU. Revista de Docencia Universitaria*, 15(2), pp.275-294.

Antonacopoulou, E.P., (2009) 'Impact and scholarship: Unlearning and practising to co-create actionable knowledge', *Management learning*, 40(4), pp.421-430.

Apuke, O.D., (2017) 'Quantitative research methods: A synopsis approach', *Kuwait Chapter of Arabian Journal of Business and Management Review*, 33(5471), pp.1-8.

Arbuckle, J.L., (2021) *IBM SPSS Amos 28 user's guide.* Amos Development Corporation.

Arbuckle, J.L., and Wothke, W., (1999) *Amos 4.0 User's Guide*. Chicago, IL: SPSS Inc.

Askegaard, S., and Linnet, J.T. (2011) 'Towards an Epistemology of Consumer Culture Theory: Phenomenology and the Context of Context', *Marketing Theory*, 11(4), 381-404.

Aspers, P. and Corte, U., (2019) 'What is qualitative in qualitative research', *Qualitative Sociology*, 42(2), pp.139-160.

Attar, R.W., Almusharraf, A., Alfawaz, A. and Hajli, N., (2022) 'New Trends in E-Commerce Research: Linking Social Commerce and Sharing Commerce: A Systematic Literature Review', *Sustainability*, 14(23), p.16024.

Attride-Stirling, J., (2001) 'Thematic networks: an analytic tool for qualitative research', *Qualitative Research*, 1(3), pp.385-405.

Auh, S., Bell, S.J., McLeod, C.S. and Shih, E., (2007) 'Co-production and customer loyalty in financial services', *Journal of retailing*, 83(3), pp.359-370.

Avvisati, F., Jacotin, G. and Vincent-Lancrin, S., (2013) 'Educating higher education students for innovative economies: What international data tell us', *Tuning Journal for Higher Education*, 1(1), pp.223-240.

Badawi, S. and Drăgoicea, M., (2023) 'Towards a Value Co-Creation Process in Collaborative Environments for TVET Education', *Sustainability*, 15(3), p.1792.

Bagozzi, R.P., (1981) 'Evaluating Structural Equation Models with Unobservable Variables and Measurement Error: A comment', *Journal of Marketing Research*, 18(3), pp.375–381.

Bagozzi, R.P. and Yi, Y., (1988) 'On the evaluation of structural equation models', *Journal of the Academy of Marketing Science*, 16, pp.74-94.

Ballantine, J. and McCourt Larres, P., (2007) 'Cooperative learning: a pedagogy to improve students' generic skills?', *Education+ Training*, 49(2), pp.126-137.

Ballantyne, D. and Varey, R.J., (2006) 'Creating value-in-use through marketing interaction: the exchange logic of relating, communicating and knowing', *Marketing Theory*, 6(3), pp.335-348.

Bandola-Gill, J., Arthur, M. and Ivor Leng, R., (2022) 'What is co-production? Conceptualising and understanding co-production of knowledge and policy across different theoretical perspectives', *Evidence & Policy*, pp.1-24.

Barbera, E., Clara, M. and Linder-Vanberschot, J.A., (2013) 'Factors influencing student satisfaction and perceived learning in online courses', *E-learning and Digital Media*, 10(3), pp.226-235.

Barney, J.B., (2018) 'Why resource-based theory's model of profit appropriation must incorporate a stakeholder perspective', *Strategic Management Journal*, 39(13), pp.3305-3325.

Barton, C., (2021) *Getting started with literature reviews.* The University of Manchester Library.

Beck, D. and Storopoli, J., (2021) 'Cities through the lens of Stakeholder Theory: A literature review', *Cities*, 118, p.103377.

Beck, D. and Ferasso, M., (2023) 'Bridging 'Stakeholder Value Creation' and 'Urban Sustainability': The need for better integrating the Environmental Dimension', *Sustainable Cities and Society*, 89, p.104316.

Beck, D., Ferasso, M., Storopoli, J. and Vigoda-Gadot, E., (2023) 'Achieving the sustainable development goals through stakeholder value creation: Building up smart sustainable cities and communities', *Journal of Cleaner Production*, 399, p.136501.

Behnam, M., Anagnostopoulos, C., Byers, T. and Papadimitriou, D.A., (2021) 'The impact of perceived corporate social responsibility on value-in-use through customer engagement in non-profit sports clubs: the moderating role of co-production', *European Sport Management Quarterly*, pp.1-22.

Belkin, G., (2023) 'Americans Are Losing Faith in College Education, WSJ-NORC Poll finds', *The Wall Street Journal.* Available at: https://www.wsj.com/articles/americans-are-losing-faith-in-college-education-wsj-norc-poll-finds-3a836ce1. (Accessed: 20th September 2023).

Bencze, J.L., (2010) 'Promoting student-led science and technology projects in elementary teacher education: Entry into core pedagogical practices through technological design', *International Journal of Technology and Design Education*, 20, pp.43-62.

Bendapudi, N. and Leone, R.P., (2003) 'Psychological implications of customer participation in co-production', *Journal of Marketing*, 67(1), pp.14-28.

Berber, N., Gašić, D., Katić, I., Borocki, J., (2022) 'The Mediating Role of Job Satisfaction in the Relationship between FWAs and Turnover Intentions', *Sustainability*, 14, p.4502.

Berdrow, I. and Evers, F.T., (2010) 'Bases of competence: an instrument for self and institutional assessment', *Assessment & Evaluation in Higher Education*, 35(4), pp.419-434.

Bereiter, C., (2005) *Education and mind in the knowledge age*. Routledge.

Beresford, P., Farr, M., Hickey, G., Kaur, M., Ocloo, J., Tembo, D. and Williams, O., (2021) 'The challenges and necessity of co-production', In *COVID-19 and Co-production in Health and Social Care Research, Policy, and Practice*, *1*.

Bergin, C., (2018) *Designing a prosocial classroom: Fostering collaboration in students from PreK-12 with the Curriculum You Already Use*. WW Norton & Company.

Bergmark, U. and Westman, S., (2016) 'Co-creating curriculum in higher education: Promoting democratic values and a multidimensional view on learning', *International Journal for Academic Development*, 21(1), pp.28-40.

Bester, K.L., McGlade, A. and Darragh, E., (2021) 'Is co-production working well in recovery colleges? Emergent themes from a systematic narrative review', *The Journal of Mental Health Training, Education and Practice*, 17(1), pp.48-60.

Bettencourt, L.A., (1997) 'Customer voluntary performance: Customers as partners in service delivery', *Journal of Retailing*, 73(3), pp.383-406.

Biersteker, T.J., (1989) 'Critical reflections on post-positivism in international relations', *International Studies Quarterly*, 33(3), pp.263-267.

Binkley, M., Erstad, O., Herman, J., Raizen, S., Ripley, M., Miller-Ricci, M. and Rumble, M., (2012) 'Defining twenty-first century skills', *Assessment and teaching of 21st century skills*, pp.17-66.

Blaschke, M., Riss, U., Haki, K. and Aier, S., (2019) 'Design principles for digital value co-creation networks: a service-dominant logic perspective', *Electronic Markets*, 29, pp.443-472.

Blau, P.M. (1964) *Exchange and power in social life*. New York: John Wiley and Sons.

Bluhm, D.J., Harman, W., Lee, T.W. and Mitchell, T.R., (2011) 'Qualitative research in management: A decade of progress', *Journal of Management Studies*, 48(8), pp.1866-1891.

Bol, N., (2011) *Co-Creation of Value in Real Estate Investments* (No. eres2011-168). European Real Estate Society (ERES).

Bond, M., Buntins, K., Bedenlier, S., Zawacki-Richter, O. and Kerres, M., (2020) 'Mapping research in student engagement and educational technology in higher education: A systematic evidence map', *International Journal of Educational Technology in Higher Education*, 17(1), pp.1-30.

Bordia, P., Restubog, S.L.D., Bordia, S., and Tang, R. L. (2017) 'Effects of resource availability on social exchange relationships: The case of employee psychological contract obligations', *Journal of Management*, 43(5), pp. 1447–1471.

Bougie, R. and Sekaran, U., (2019) *Research methods for business: A skill building approach*. John Wiley & Sons.

Bourdieu, P., (1986) 'The forms of capital.' In J. Richardson (Ed.), *Handbook of theory and research for the sociology of education* (pp. 241–258). Greenwood.

Bovill, C., (2020) 'Co-creation in Learning and Teaching: The Case for a Whole-Class Approach in Higher Education', *Higher Education*, 79(6), pp.1023–1037.

Bovill, C. and Woolmer, C., (2019) 'How conceptualisations of curriculum in higher education influence student-staff co-creation in and of the curriculum', *Higher Education*, 78(3), pp.407-422.

Bovill, C., Cook-Sather, A. and Felten, P., (2011) 'Students as co-creators of teaching approaches, course design, and curricula: implications for academic developers', *International Journal for Academic Development*, 16(2), pp.133-145.

Bowden, J.L.H. and D'Alessandro, S., (2011) 'Co-creating value in higher education: The role of interactive classroom response technologies', *Asian social science*, 7(11), p.35.

Bowman, C. and Ambrosini, V., (2000) 'Value creation versus value capture: towards a coherent definition of value in strategy', *British Journal of Management*, 11(1), pp.1-15.

Boyle, E., (2007) 'A process model of brand cocreation: brand management and research implications', *Journal of Product & Brand Management*, 16(2), pp.122-131.

Boza, A., Cuenca, L., Fernández-Diego, M., Ruiz, L., Gordo, M., Alarcón, F., Alemany, M.M.E. and Poler, R., (2014) 'Innovation, creativity and entrepreneurship competence in higher education. learning objectives and measurement', In *ICERI2014 Proceedings* (pp. 405-411). IATED.

Bozic, N., (2017) 'Integrated model of innovative competence', *Journal of Creativity and Business Innovation*, 3, pp.140-169.

Boztepe, Ö., (2016) 'The adaptation of student communication satisfaction scale into Turkish culture', *International Journal of Educational Research Review*, 2(1), pp.27-33.

Braga, B.D.R., (2023) 'Complex, Dynamic and Contingent Social Processes as Patterns of Decision-Making Events. Philosophical and Mathematical Foundations', *European Journal of Pragmatism and American Philosophy*, 15(XV-1).

Brambilla, F.R., (2016) 'Exploring the Co-creation of Value in the Brazilian Private Higher Educational Service', *Revista de Administração FACES Journal*.

Brandão, H.P., Borges-Andrade, J.E., Puente-Palacios, K. and Laros, J.A., (2012) 'Relationships between learning, context and competency: a multilevel study', *BAR-Brazilian Administration Review*, 9, pp.1-22.

Brandsen, T. and Honingh, M., (2018) 'Definitions of co-production and co-creation', In *Co-production and co-creation* (pp. 9-17). Routledge.

Brandsen, T., and Pestoff, V., (2006) 'Co-production, the third sector and the delivery of public services', *Public Management Review*, 8(4), pp.493-501.

Brandsen, T., Steen, T. and Verschuere, B., (2018a) 'Co-creation and co-production in public services: Urgent issues in practice and research', In *Co-production and co-creation* (pp. 3-8). Routledge.

Brandsen, T., Steen, T. and Verschuere, B., (2018b) *Co-production and co-creation: Engaging citizens in public services* (p. 322). Taylor & Francis.

Braun, V. and Clarke, V., (2006) 'Using thematic analysis in psychology', *Qualitative Research in Psychology*, 3(2). pp.77-101.

Breidbach, C.F. and Maglio, P.P. (2016) 'Technology-enabled value co-creation: an empirical analysis of actors, resources, and practices, *Industrial Marketing Management*, 56, pp. 73-85.

Brix, J., Krogstrup, H.K. and Mortensen, N.M., (2017) 'Evaluating the effects of co-production initiatives in public service organizations', In *Proceedings of the XVIII Nordic Political Science Congress*.

Broad, R. and House, B., (2008) 'Networked-in; developing a model of network marketing performance', In *24th Annual IMP Conference. Uppsala, Sweden.

Bruns, K. and Jacob, F., (2014) 'Value-in-use and mobile technologies: A general approach for value-in-use measurement and a specific application based on smartphone usage', *Wirtschaftsinformatik*, 56, pp.381-393.

Bruton, D., (2011) 'Learning creativity and design for innovation', *International Journal of Technology and Design Education*, 21, pp.321-333.

Bryman, A., (2012) *Social research methods* (Fourth Edition). Oxford: Oxford University Press.

Bryson, C., (2016) 'Engagement through partnership: Students as partners in learning and teaching in higher education', *International Journal for Academic Development*, 21(1), pp.84-86.

Burman, E. and Parker, I., (1993) *Discourse Analytic Research: Repertoires and Readings of Texts in Action*. London: Routledge.

Butter, R. and Van Beest, W., (2017) 'Psychometric validation of a tool for innovation competencies development and assessment using a mixed-method design', *EURAM (21-24 June), Glasgow*.

Byon, K.K., Zhang, J. and Jang, W., (2022) 'Examining the Value Co-Creation Model in Motor Racing Events: Moderating Effect of Residents and Tourists', *Sustainability*, 14(15), p.9648.

Byrne, B.M., (2001) *Structural Equation Modeling with AMOS: Basic Concepts, Applications, and Programming*. Mahway, New Jersey: Lawrence Erlbaum Associates, Publishers.

Byrne, B.M., (2006) *Structural Equation Modelling with EQS: Basic concepts, applications and Programming.* 2 edn ed. New Jersey: Lawrence Erlbaum Associates, Inc.

Byrne, B.M., (2016) *Structural Equation Modeling With AMOS: Basic Concepts, Applications, and Programming*, Third Edition (3rd ed.). Routledge.

Cai, D., (2022) 'December. Research on the Influence of Gamification Affordance on Consumers' Willingness to Continue to Participate', In *2nd International Conference on Management Science and Software Engineering (ICMSSE 2022)* (pp. 867-873). Atlantis Press.

Caldwell, K.W., Millis, C., Constant, T.N., Borg, P., Threatt-Morgan, K. and Burke, C.J., (2021) 'Student Readiness of Colleges: A Qualitative Study', *Journal of College Access*, 6(1), p.5.

Canhoto, A.I., Quinton, S., Jackson, P. and Dibb, S., (2016) 'The co-production of value in digital, university–industry R&D collaborative projects', *Industrial Marketing Management*, 56, pp.86-96.

Carvalho, P., Díaz-Méndez, M., Quero-Gervilla, M. and Saren, M., (2023) 'A conceptual approach to the tourist value co-creation: Dimensions, antecedents and consequences', *European Journal of Tourism Research*, 34, pp.3407-3407.

Casidy, R., Leckie, C., Nyadzayo, M.W. and Johnson, L.W., (2022) 'Customer brand engagement and co-production: an examination of key boundary conditions in the sharing economy', *European Journal of Marketing*, 56(10), pp.2594-2621.

Cavallone, M., Ciasullo, M.V., Manna, R. and Palumbo, R., (2022) 'A tale of two stakeholders: achieving excellence by merging quality expectations in Higher Education institutions', *Studies in Higher Education*, 47(2), pp.244-258.

Cerinsek, G. and Dolinsek, S., (2009) 'Identifying employees' innovation competency in organisations', *International Journal of Innovation and Learning*, 6(2), pp.164-177.

Chakravartty, A., (2021) 'Philosophical foundations of research, and the case of the epistemic well, in a least developed nation', *Journal of Educational & Psychological Research*, 5(1), 602-621.

Chang, C.C., (2014) 'An instructional cycle for enhancing innovation-embedded employability', *Education+ Training*, 56(8/9), pp.870-883.

Chang, Y., Eklund, T., Kantola, J.I. and Vanharanta, H., (2009) 'International creative tension study of university students in South Korea and Finland', *Human Factors and Ergonomics in Manufacturing & Service Industries*, 19(6), pp.528-543.

Chang, Y., Kantola, J. and Vanharanta, H., (2007) 'A study of creative tension of engineering students in Korea', *Human Factors and Ergonomics in Manufacturing & Service Industries*, 17(6), pp.511-520.

Chapman, C., (2019) 'From hierarchies to networks: Possibilities and pitfalls for educational reform of the middle tier', *Journal of Educational Administration*, 57(5), pp. 554-570.

Charosky, G. and Bragós, R., (2021) 'Investigating students' self-perception of innovation competences in challenge-based and product development courses', *International Journal of Engineering Education*, 37(2), pp.461-470.

Charosky, G., Hassi, L., Papageorgiou, K. and Bragós, R., (2022) 'Developing innovation competences in engineering students: a comparison of two approaches', *European Journal of Engineering Education*, 47(2), pp.353-372.

Chatenier, E.D., Verstegen, J.A., Biemans, H.J., Mulder, M. and Omta, O.S.F., (2010) 'Identification of competencies for professionals in open innovation teams', *R&d Management*, 40(3), pp.271-280.

Chater, N., Oaksford, M., Hahn, U. and Heit, E., (2011) 'Inductive logic and empirical psychology', In *Handbook of the History of Logic* (Vol. 10, pp. 553-624). North-Holland.

Chatterjee, S., Rana, N.P. and Dwivedi, Y.K., (2021) 'Assessing consumers' co-production and future participation on value co-creation and business benefit: an FPCB model perspective', *Information Systems Frontiers*, pp.1-20.

Chatzara, M. and Tsiakis, T., (2023) 'Literature review of value co-creation in education institutes: current states and future perspectives', *Journal of Education, Society & Multiculturalism*, 4(1), pp.30-50.

Chell, E. and Athayde, R., (2009) *The identification and measurement of innovative characteristics of young people: Development of the youth innovation skills measurement tool*. NESTA. Available at: https://eprints.kingston.ac.uk/id/eprint/5985/2/Chell-E-5985.pdf (Accessed: 11 July 2022).

Chell, E., (2007) 'Social enterprise and entrepreneurship: Towards a convergent theory of the entrepreneurial process', *International Small Business Journal*, 25(1), pp.5-26.

Cheon, S.H., Reeve, J. and Marsh, H.W., (2023) 'Autonomy-supportive teaching enhances prosocial and reduces antisocial behavior via classroom climate and psychological needs: A multilevel randomized control intervention', *Journal of Sport and Exercise Psychology*, 1(aop), pp.1-15.

Chesbrough, H., Lettl, C. and Ritter, T., (2018) 'Value creation and value capture in open innovation', *Journal of Product Innovation Management*, 35(6), pp.930-938.

Chilisa, B., (2019) *Indigenous research methodologies*. Sage publications.

Chilisa, B. and Kawulich, B., (2012) 'Selecting a research approach: Paradigm, methodology and methods', *Doing social research: A global context*, 5(1), pp.51-61.

Cho, Y.H., (2017) 'Towards an engaged campus: measuring and comparing definitive stakeholders' perceptions of university social engagement in South Korea', *International Journal of Sustainability in Higher Education*, 18(2), pp.185-202.

Choi, E.K., Wilson, A. and Fowler, D., (2013) 'Exploring customer experiential components and the conceptual framework of customer experience, customer satisfaction, and actual behavior', *Journal of Foodservice Business Research*, 16(4), pp.347-358.

Chow, C.M., Ruhl, H. and Buhrmester, D., (2013) 'The mediating role of interpersonal competence between adolescents' empathy and friendship quality: A dyadic approach', *Journal of Adolescence*, 36(1), pp.191-200.

Clark, T., Foster, L., Sloan, L. and Bryman, A., (2021) *Bryman's social research methods*. 6th edition. Oxford: Oxford University Press.

Clark, W.C., Van Kerkhoff, L., Lebel, L. and Gallopin, G.C., (2016) 'Crafting usable knowledge for sustainable development', *Proceedings of the National Academy of Sciences*, 113(17), pp.4570-4578.

Cobo, C., (2013) 'Skills for innovation: envisioning an education that prepares for the changing world', *The Curriculum Journal*, 24(1), pp.67-85.

Cohen, J. W., (1988) *Statistical power analysis for the behavioural sciences.* 2nd edn ed. Hillsdale, NJ: Lawrence Erlbaum Associates.

Cohen, L., Manion, L. and Morrison, K., (2017) *Research methods in education* (8th edition). Routledge.

Coleman, J.S., (1988) 'Social capital in the creation of human capital', *American Journal of Sociology*, 94, pp.S95-S120.

Collins, R., (2019) 'How to focus on student success', *Wonkhe*. Available at: https://wonkhe.com/blogs/how-to-focus-on-student-success/ (Accessed: 2 November 2022).

Commonwealth of Australia, (2009) *Powering Ideas: An Innovation Agenda for the 21st Century*, Canberra. Available at: https://webarchive.nla.gov.au/awa/20091027125808/http://www.innovation.gov.au/innovationreview/Documents/PoweringIdeas_fullreport.pdf (Accessed: 20th October 2023).

Compton, M.E. and Meier, K.J., (2016) 'Managing social capital and diversity for performance in public organizations', *public administration*, 94(3), pp.609-629.

Cook, K.S., Cheshire, C., Rice, E.R.W., and Nakagawa, S., (2013) 'Social exchange theory', In J. De Lamater and A. Ward (Eds.), *Handbook of social psychology* (pp. 61–88). Springer: Netherlands.

Cook-Sather, A. and Luz, A., (2015) 'Greater engagement in and responsibility for learning: What happens when students cross the threshold of student–faculty partnership', *Higher Education Research & Development*, 34(6), pp.1097-1109.

Cook-Sather, A., Bovill, C. and Felten, P., (2014) *Engaging students as partners in learning and teaching: A guide for faculty*. John Wiley & Sons.

Cooper, D.R. and Schindler, P.S., (1998) *Business research methods*, 6th edn, Irwin/McGraw-Hill Singapore.

Creswell J.W., (2013) *Qualitative inquiry & research design: choosing among five approaches* (Third edition). Los Angeles: SAGE Publications.

Creswell, J.W. and Clark, V.L.P., (2017) *Designing and conducting mixed methods research*. Sage publications.

Creswell, J.W., and Creswell, J.D., (2018) *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (Fifth Edition). Thousand Oaks, California, SAGE Publications, Inc.

Creswell, J.W., and Creswell, J.D., (2022) *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (Sixth Edition). Sage Publications, Inc.

Cropanzano, R., and Mitchell, M.S., (2005) 'Social exchange theory: An inter-disciplinary review', *Journal of Management*, 31(6), pp. 874–900.

Cropley, D. and Cropley, A., (2010) 'Recognizing and fostering creativity in technological design education', *International Journal of Technology and Design Education*, 20, pp.345-358.

Crosier, D., Purser, L. and Smidt, H., (2007) *Trends 5: Universities Shaping the European Higher Education Area*. EAU.

Crotty, M., (1998) *The Foundations of Social Research*. London: Sage.

Czaja, R., (1998) 'Questionnaire pretesting comes of age', *Marketing Bulletin-Department of Marketing Massey University*, 9, pp.52-66.

da Costa, FJ, (2009) 'Education in tourism from the student's perspective: perceived value in the course, perception of prestige and identification with the profession', *Turismo-Visão e Ação*, 11(1), pp.3-22.

Da Silva, N. and Davis, A., (2011) 'Absorptive capacity at the individual level: Linking creativity to innovation in academia', *The Review of Higher Education*, 34(3), pp.355–379.

Danaher, T.S. and Gallan, A.S., (2016) 'Service research in health care: Positively impacting lives', *Journal of Service Research*, 19(4), pp.433-437.

Daskalopoulou, I., Karakitsiou, A. and Thomakis, Z., (2023) 'Social Entrepreneurship and Social Capital: A Review of Impact Research', *Sustainability*, 15(6), p.4787.

Dávid, B., Herke, B., Huszti, É., Tóth, G., Túry-Angyal, E. and Albert, F., (2023) 'Reshaping Social Capital During the Pandemic Crisis: Age Group Differences in Face-to-Face Contact Network Structures', *Social Inclusion*, 11(1).

Davies, R., (2018) 'Representing theories of change: Technical challenges with evaluation consequences', *Journal of Development Effectiveness*, 10(4), pp.438-461.

Davlembayeva, D. and Alamanos, E., (2023) 'Social Exchange Theory: A review', In S. Papagiannidis (Ed), *TheoryHub Book.*

De Borba, D., (2022) November. 'Value Co-Destruction in Digital Banking Transformation: Research Propositions', In *European Conference on the Impact of Artificial Intelligence and Robotics*, 4(1), pp.126-134.

De Cock, C. and Land, C., (2006) 'Organization/literature: Exploring the seam', *Organization Studies*, 27(4), pp.517-535.

De Jong, J. and Den Hartog, D., (2010) 'Measuring innovative work behaviour', *Creativity and Innovation Management*, 19(1), pp.23-36.

de Olagüe-Smithson, C., (2019) *Analysing erasmus+ vocational education and training funding in Europe* (Vol. 30). Springer.

Dean, A.M., Griffin, M. and Kulczynski, A., (2016) 'Applying service logic to education: The co-creation experience and value outcomes', *Procedia-Social and Behavioral Sciences*, 224, pp.325-331.

Deci, E.L. and Ryan, R.M., (1980) 'The empirical exploration of intrinsic motivational processes', In *Advances in experimental social psychology* (Vol. 13, pp. 39-80). Academic Press.

Deci, E.L. and Ryan, R.M., (1985) 'The general causality orientations scale: Self-determination in personality', *Journal of Research in Personality*, 19(2), pp.109-134.

Deci, E.L. and Ryan, R.M., (2000) 'The" what" and" why" of goal pursuits: Human needs and the self-determination of behavior', *Psychological Inquiry*, 11(4), pp.227-268.

Denzin, N.K. and Lincoln, Y.S., (2005) *The Sage handbook of qualitative research* (3rd ed.). Thousand Oaks, CA: Sage.

Denzin, N.K. and Lincoln, Y.S., (2011) *The SAGE Handbook of Qualitative Research* (4th ed.). Thousand Oaks, CA: Sage.

Díaz-Méndez, M. and Gummesson, E., (2012) 'Value co-creation and university teaching quality: consequences for the European higher education area (EHEA)', *Journal of Service Management*, 23(4), pp.571-592.

Dziewanowska, K., (2018) 'Value co-creation styles in higher education and their consequences. The Case of Poland', *UC Berkeley CSHE*, 10(18).

Dobson, G. and Edersheim, K., (2021) 'Networks can improve international student experience', *University World News*, 16 October. Available at: https://www.universityworldnews.com/post.php?story=20211013101404820 (Accessed: 22 January 2023).

Dollinger, M., (2018) 'Higher education's value: In the experience itself', *Research and Development in Higher Education:[Re] Valuing Higher Education*, 41, pp.60-68.

Dollinger, M. and Lodge, J.M., (2018) 'Co-creation strategies for learning analytics', In *Proceedings of the 8th international conference on learning analytics and knowledge* (pp. 97-101).

Dollinger, M., Lodge, J. and Coates, H., (2018) 'Co-creation in higher education: Towards a conceptual model', *Journal of Marketing for Higher Education*, 28(2), pp.210-231.

Dollinger, M. and Lodge, J., (2020) 'Student-staff co-creation in higher education: an evidence-informed model to support future design and implementation', *Journal of Higher Education Policy and Management*, 42(5), pp.532-546.

dos Santos, C.A.F. and Zen, A.C., (2022) 'Value creation and capture in innovation ecosystems', *International Journal of Innovation*, 10(3), pp.483-503.

Dudovskiy, J., (2016) 'The ultimate guide to writing a dissertation in business studies: a step-by-step assistance', (2016 edition). *eBook Journal of Mixed Methods Research*, 4(1), pp.6-16.

Durall, E., Bauters, M., Hietala, I., Leinonen, T. and Kapros, E., (2019) 'Co-creation and co-design in technology-enhanced learning: Innovating science learning outside the classroom', *IxD&A*, *42*, pp.202-226.

Durose, C., Needham, C., Mangan, C., and Rees, J. (2017) 'Generating 'good enough' evidence for co-production', *Evidence & Policy: A Journal of Research, Debate and Practice*, 13(1), pp.135-151.

Durose, C., Perry, B. and Richardson, L., (2022) 'Is co-production a 'good' concept? Three responses', *Futures*, 142, p.102999.

Dusi, D. and Huisman, J., (2021) 'It's more complex than it seems! Employing the concept of prosumption to grasp the heterogeneity and complexity of student roles in higher education', *Higher Education*, 81(5), pp.935-948.

Dzansi, D.Y., Chipunza, C. and Mashavira, N., (2019) 'Managerial interpersonal competencies and the performance of family-and non-family-owned small and medium-sized enterprises in Zimbabwe and South Africa', *SA Journal of Human Resource Management*, 17(1), pp.1-15.

Eby, L.T., Hurst, C.S. and Butts, M.A., (2009). 'Qualitative research: the redheaded stepchild in organizational and social science research?', In Lance, C. and Vandenberg, R. (Eds), *Statistical and Methodological Myths and Urban Legends: Doctrine, Verity and Fable in the Organizational and Social Sciences*. New York: Routledge, pp.221–44.

Echeverri, P. and Skålén, P., (2011) 'Co-creation and co-destruction', *Marketing Theory*, 11(3), pp.351–373.

Edmondson, A.C., (2013) *Teaming to innovate*. John Wiley & Sons.

Edwards-Schachter, M., García-Granero, A., Sánchez-Barrioluengo, M., Quesada-Pineda, H. and Amara, N., (2015) 'Disentangling competences: Interrelationships on creativity, innovation and entrepreneurship', *Thinking Skills and Creativity*, 16, pp.27-39.

Eggert, A., Ulaga, W., Frow, P. and Payne, A., (2018) 'Conceptualizing and communicating value in business markets: From value in exchange to value in use', *Industrial Marketing Management*, *69*, pp.80-90.

Eijk, C. and Steen, T., (2016), 'Why engage in co-production of public services? Mixing theory and empirical evidence', *International Review of Administrative Sciences*, 82(1), pp.28-46.

Einstein, A., (1950) 'On the generalized theory of gravitation', *Scientific American*, 182(4), pp.13-17.

EL Mekebbaty, M.M.A., (2023) 'The mediating role of customer participation in the relationship between customer attitude and customer citizenship behavior of online shopping customers', *Scientific Journal for Financial and Commercial Studies and Research*, 4(2)1, pp.157-206.

Elnaggar, A. and Hassan, A.A., (2023) 'The Moderating Role of Customer Education in the relationship between Digitalization and Value Co-Creation: Applied on Microfinance Non-Banking Companies in Egypt', *Scientific Journal for Financial and Commercial Studies and Research*, 4(1), pp.547-585.

Elo, J., Pekkala, K. and Tuunanen, T., (2023) 'Managing Continuous Digital Service Innovation for Value Co-Creation', In *Proceedings of the Annual Hawaii International Conference on System Sciences*. University of Hawai'i at Manoa.

Elliott, I.C., Robson, I. and Dudau, A., (2021) 'Building student engagement through co-production and curriculum co-design in public administration programmes', *Teaching Public Administration*, 39(3), pp.318-336.

Elsharnouby, T.H., (2015) 'Student co-creation behavior in higher education: The role of satisfaction with the university experience', *Journal of Marketing for Higher Education*, 25(2), pp.238-262.

Emami, M., Rezaei, S., Valaei, N. and Gardener, J., (2023) 'Creativity mindset as the organizational capability: the role of creativity-relevant processes, domain-relevant skills and intrinsic task motivation', *Asia-Pacific Journal of Business Administration*, 15(1), pp.139-160.

Etgar, M., (2008) 'A descriptive model of the consumer co-production process', *Journal of the Academy of Marketing Science*, 36, pp.97-108.

European Commission, (2010) *New Skills for New Jobs: Action Now. Report by the Expert Group on New Skills for New Jobs Prepared for the European Commission*, Publications Office, Luxembourg.

Expert Group on Future Skills Needs, (2007) 'Tomorrow's Skills: Towards a National Skills Strategy', 5th Report. *Dublin, Stationery Office*.

Falk, C.F. and Muthukrishna, M., (2023) 'Parsimony in model selection: Tools for assessing fit propensity', *Psychological Methods*, 28(1), p.123.

Fan, X. and Luo, Y., (2020) 'Value co-creation: A literature review', *Open Journal of Social Sciences*, 8(02), p.89.

Farrell, M.P., (2003) *Collaborative circles: Friendship dynamics and creative work*. University of Chicago Press.

Ferreras-Garcia, R., Sales-Zaguirre, J. and Serradell-López, E., (2021) 'Sustainable innovation in higher education: the impact of gender on innovation competences', *Sustainability*, 13(9), p.5004.

Fisher, C.D., (1978) 'The effects of personal control, competence, and extrinsic reward systems on intrinsic motivation', *Organizational behavior and human performance*, 21(3), pp.273-288.

Fornell, C. and Larcker, D.F., (1981) 'Structural equation models with unobservable variables and measurement error: Algebra and statistics,' *Journal of Marketing Research*, 18(3), pp.382–88.

Foroudi, P., Yu, Q., Gupta, S. and Foroudi, M.M., (2019) 'Enhancing university brand image and reputation through customer value co-creation behaviour', *Technological Forecasting and Social Change*, 138, pp.218-227.

Freeman, R.E., Harrison, J.S. and Wicks, A.C., (2007) *Managing for stakeholders: Survival, reputation, and success*. Yale University Press.

Freeman, R.E., (2017) 'Five challenges to stakeholder theory: A report on research in progress', In *Stakeholder management* (Vol. 1, pp. 1-20). Emerald Publishing Limited.

Fuentes, M., Smyth, H. and Davies, A., (2019) 'Co-creation of value outcomes: A client perspective on service provision in projects', *International Journal of Project Management*, 37(5), pp.696-715.

Fuller, C.M., Simmering, M.J., Atinc, G., Atinc, Y. and Babin, B.J., (2016) 'Common methods variance detection in business research', *Journal of Business Research*, 69(8), pp.3192-3198.

Fusco, F., Marsilio, M. and Guglielmetti, C., (2023) 'Co-creation in healthcare: framing the outcomes and their determinants', *Journal of Service Management*, 34(6), pp.1-26.

Gabriel, Y., Gray, D.E. and Goregaokar, H., (2013) 'Job loss and its aftermath among managers and professionals: wounded, fragmented and flexible', *Work, Employment and Society*, 27(1), pp.56-72.

Galguera, M.P., (2018) *Globalization, mass education and technical and vocational education and training*. Springer: Switzerland.

Gallouj, F. and Savona, M., (2010) 'Towards a theory of innovation in services: a state of the art', *The handbook of innovation and services: A multi-disciplinary perspective*, pp.27-48.

Gallouj, F. and Weinstein, O., (1997) 'Innovation in services', *Research policy*, 26(4-5), pp.537-556.

Galpin, A., Beevers, D., Cassidy, S., Short, B., Panagiotidi, M., Bendall, R.C., Quigley, E. and Thompson, C., (2022) 'Values-led curriculum co-creation: A curriculum re-innovation case study', *The Curriculum Journal*, 33(4), pp.553-569.

Galvagno, M. and Dalli, D., (2014) 'Theory of value co-creation: a systematic literature review', *Managing Service Quality*, 24(6), pp.643-683.

Garcia, I., Noguera, I. and Cortada-Pujol, M., (2018) 'Students' perspective on participation in a co-design process of learning scenarios', *The Journal of Educational Innovation, Partnership and Change*, 4(1).

Gašić, D. and Berber, N., (2023) 'The Mediating Role of Employee Engagement in the Relationship between Flexible Work Arrangements and Turnover Intentions among Highly Educated Employees in the Republic of Serbia', *Behavioral Sciences*, 13(2), p.131.

Gebauer, H., Johnson, M. and Enquist, B., (2010) 'Value co-creation as a determinant of success in public transport services: A study of the Swiss federal railway operator (SBB)', *Managing Service Quality*, 20(6), pp.511-530.

George, D. and Mallery, P., (2016) *IBM SPSS Statistics 23 Step by Step*. 4. Baskı.

Gerbing, D.W. and Anderson, J.C., (1988) 'An updated paradigm for scale development incorporating unidimensionality and its assessment', *Journal of Marketing Research*, 25(2), pp.186-192.

Gertler, P.J., Martinez, S., Premand, P., Rawlings, L.B. and Vermeersch, C.M., (2016) *Impact evaluation in practice*. World Bank Publications.

Gherheș, V., Stoian, C.E., Fărcașiu, M.A. and Stanici, M., (2021) 'E-learning vs. face-to-face learning: Analyzing students' preferences and behaviors', *Sustainability*, 13(8), p.4381.

Gill, J. and Johnson, P., (2010) *Research Methods for Managers* (4th edn). London: Sage.

Giner, G.R., and Rillo, A.P., (2016) 'Structural equation modeling of cocreation and its influence on the student's satisfaction and loyalty towards university', *Journal of Computational and Applied Mathematics*, 291, pp.257–263.

Glaser, B., (1992) *Basics of Grounded Theory Analysis.* Mill Valley: Sociology Press.

Glassman, A.M. and Opengart, R., (2016) 'Teaching innovation and creativity: Turning theory into practice', *Journal of International Business Education*, 11, p.113.

Goldstein, H. and Blinkhorn, S., (1982) 'The Rasch model still does not fit', *British Educational Research Journal*, 8(2), pp.167-170.

Golubchikov, O., (2020) *People-smart sustainable cities*. UNECE.

Gramza, J., (2022) *Budget deficits threaten SUNY schools as staff, legislators call for state funding.* Available at: https://buffalonews.com/news/local/education/budget-deficits-threaten-suny-schools-as-staff-legislators-call-for-state-funding/article_2c76a786-75a2-11ed-a7f9-377c8e5e85c5.html (Accessed: 1 June 2023).

Grönroos, C., (2011) 'Value co-creation in service logic: A critical analysis', *Marketing Theory*, 11(3), pp.279-301.

Grönroos, C. and Gummerus, J., (2014) 'The service revolution and its marketing implications: service logic vs service-dominant logic', *Managing Service Quality*, 24(3), pp.206-229.

Guest, G., MacQueen, K.M. and Namey, E.E., (2011) *Applied thematic analysis*. sage publications.

Guan, S., Deng, G. and Tian, S., (2019) 'Co-production and innovation in public services: What can we learn from the provision of childcare in rural China?', *Freie Universität Berlin.*

Guenzi, P. and Troilo, G., (2006) 'Developing marketing capabilities for customer value creation through Marketing–Sales integration', *Industrial Marketing Management*, 35, pp.974–988.

Gunarto, M. and Cahyawati, D., (2022) 'Experience Value as a Mediator Variable for Co-Creation Relationship on Alumni Loyalty: Using the SEM-PLS Model Approach', *Jurnal Organisasi dan Manajemen*, 18(1), pp.46-59.

Gustafsson, A., Kristensson, P. and Witell, L., (2012) 'Customer co-creation in service innovation: a matter of communication?', *Journal of service management*, 23(3), pp.311-327.

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., and Tatham, R. L. (2019) *Multivariate data analysis* (8th ed.). Hampshire, United Kingdom: Cengage.

Hair, J. F., Hult, G. T. M., Ringle, C. M., and Sarstedt, M. (2014) *A Primer on Partial Least Squares Structural Equation Modelling (PLS-SEM)*. Los Angeles: SAGE Publications.

Hammouch, H., Hein, A.M. and Condat, H., (2021) 'A conceptual model for organizational competences', *Proceedings of the Design Society*, 1, pp.41-50.

Hamzah, F.M., Abd Rashid, M.N., Ab Rahman, M.N. and Rasul, M.S., (2022) 'Evaluating the Validity and Reliability of Authentic Learning Instruments using RASCH Model', *International Journal of Global Optimization and Its Application*, 1(3), pp.182-189.

Hamzah, M.S.G. and Abdullah, S.K., (2009) 'Generic skills needed to produce human capital with" first class mentality"', *European Journal of Social Sciences*, 10(1), pp.102-110.

Handema, M., Lungu, J., Chabala, M. and Shikaputo, C., (2023) 'Conceptualising the Philosophical Underpinning of the Study: A Practical Perspective', *Open Journal of Philosophy*, 13(2), pp.257-268.

Hansen, A.V., (2019) 'Value co-creation in service marketing: A critical (re) view', *International Journal of Innovation Studies*, 3(4), pp.73-83.

Haput, S. and Antonites, A., (2020) 'Factors Influencing Innovation Adoption in a Higher Education Institution', *European Journal of Teaching and Education*, 2(2), pp.60-74.

Harkayy, I. (2001) 'Creating democratic civic universities in a post-covid world: The IAU and global collaboration', in van't Land, H., Corcoran, A. and Iancu, D.C. *The Promise of Higher Education: Essays in Honour of 70 Years of IAU*. Cham: Springer Nature, pp. 55-61.

Hart, C. (1998) *Doing a Literature Review*. London: Sage.

Hartman, R.S., (1995) 'Formal Axiology and Its Critics', In *Formal Axiology and Its Critics* (pp. 51-141). Brill.

Hassan, R.H., Hassan, M.T., Naseer, S., Khan, Z. and Jeon, M., (2021) 'ICT enabled TVET education: a systematic literature review', *IEEE Access*, 9, pp.81624-81650.

Heigham, J. and Croker, R. eds., (2009) *Qualitative research in applied linguistics: A practical introduction*. Springer.

Hein, A., Weking, J., Schreieck, M., Wiesche, M., Böhm, M. and Krcmar, H., (2019) 'Value co-creation practices in business-to-business platform ecosystems', *Electronic Markets*, 29, pp.503-518.

Hero, L.M., Lindfors, E. and Taatila, V., (2017) 'Individual Innovation Competence: A Systematic Review and Future Research Agenda', *International Journal of Higher Education*, 6(5), pp.103-121.

Herrala, M., Pakkala, P. and Haapasalo, H., (2011) 'Value-creating networks–A conceptual model and analysis', *Research reports in Department of Industrial Engineering and Management*, 4(201), p.12. Available at: https://institute.eib.org/wp-content/uploads/2016/04/Final_Report_2009_Value-creating_networks_-_a_conceptual_model_and_analysis.pdf (Accessed: 30 August 2022).

Hodgson, G.M., (1998) 'Evolutionary and competence-based theories of the firm', *Journal of Economic Studies*, 25(1), pp.25-56.

Hoge, M.A., Tondora, J. and Marrelli, A.F., (2005) 'The fundamentals of workforce competency: Implications for behavioral health', *Administration and Policy in Mental Health and Mental Health Services Research*, 32(5-6), pp.509-531.

Hoidn, S. and Kärkkäinen, K., (2014) 'Promoting skills for innovation in higher education: A literature review on the effectiveness of problem-based learning and of teaching behaviours', *OECD Education Working Papers*, No. 100, OECD Publishing, Paris.

Holbrook, M.B., (2001) 'Times Square, Disneyphobia, Hegemickey, the Ricky Principle, and the downside of the entertainment economy: It's fun-dumb-mental', *Marketing Theory*, 1(2), pp.139-163.

Holmes-Smith, C.E., Coote, L. and Cunningham, E., (2006) *Structural equation modelling: from the fundamentals to advanced topics, School Research, Evaluation and Measurement Services, Education & Statistics Consultancy.*

Holton III, E.F., Bates, R.A., Bookter, A.I. and Yamkovenko, V.B., (2007) 'Convergent and divergent validity of the learning transfer system inventory', *Human Resource Development Quarterly*, 18(3), pp.385-419.

Homans, G.C. and Merton, R.K., (1961) *Social behavior: its elementary forms.* New York:Harcourt, Braceand World.

Honingh, M., Bondarouk, E. and Brandsen, T., (2020) 'Co-production in primary schools: A systematic literature review', *International Review of Administrative Sciences*, 86(2), pp.222-239.

Hooper, D., Coughlan, J.I. and Mullen, M.R., (2008) 'Structural equation modelling: Guidelines for determining model fit', *Electronic Journal of Business Research Methods*, 6(1), pp.53-60.

Hotambekovna, E.M., (2022) 'Complexity and non-linearity as the main characteristics of the educational system', *International Journal of Intellectual Cultural Heritage*, 2(5), pp.15-25.

Hsieh, S.H. and Chang, A., (2016) 'The psychological mechanism of brand co-creation engagement', *Journal of Interactive Marketing*, 33(1), pp.13-26.

Hsu, P.F., Nguyen, T.K. and Huang, J.Y., (2021) 'Value co-creation and co-destruction in self-service technology: A customer's perspective', *Electronic Commerce Research and Applications*, 46(101), 101029.

Hu, M.L.I.C.M., Horng, J.S. and Teng, C.C., (2016) 'Developing A model for an innovative culinary competency curriculum and examining its effects on students' performance', *The Journal of Creative Behavior*, 50(3), pp.193-202.

Hughes, D.J., Lee, A., Tian, A.W., Newman, A. and Legood, A., (2018) 'Leadership, creativity, and innovation: A critical review and practical recommendations', *The Leadership Quarterly*, 29(5), pp.549-569.

Hussain, K. and Wahab, E., (2021) 'Reviewing the Link between Employee Creativity, Innovative Behavior and Organizational Innovation', *11th Annual International Conference on Industrial Engineering and Operations Management,* Singapore.

Hussey, J. and Hussey, R., (1997) *Business Research: A practical Guide for Undergraduate and Postgraduate Students*. Macmillan Press Ltd. Great Britain.

Hutchby, I. and Wooffitt, R., (1998) *Conversation analysis: Principles, practices and applications*. Oxford: Polity Press.

Hutchins, K., Lindenfeld, L.A., Bell, K.P., Leahy, J. and Silka, L., (2013) 'Strengthening knowledge co-production capacity: examining interest in community-university partnerships', *Sustainability*, 5(9), pp.3744-3770.

IFAC (2020) *Understanding value creation*. New York. Available at: https://www.ifac.org/knowledge-gateway/preparing-future-ready-professionals/publications/understanding-value-creation (Accessed: 30 August 2022).

Ingram, J., Gaskell, P., Mills, J., Dwyer, J. and de Wolf, P., (2016) 'Inserting co-innovation into research translation: experiences from the VALERIE project', In *12th European International Farming Systems Association (IFSA) Symposium, Social and technological transformation of farming systems: Diverging and converging pathways, 12-15 July 2016, Harper Adams University, Newport, Shropshire, UK*, pp. 1-10. International Farming Systems Association (IFSA) Europe.

Itani, O.S., Badrinarayanan, V. and Rangarajan, D., (2023) 'The impact of business-to-business salespeople's social media use on value co-creation and cross/up-selling: The role of social capital', *European Journal of Marketing*, 57(3), pp.683-717.

Jackson, D.L., Gillaspy Jr, J.A., and Purc-Stephenson, R. (2009) 'Reporting practices in confirmatory factor analysis: an overview and some recommendations', *Psychological Methods*, 14(1), p.6.

Jacob, F. and Rettinger, B., (2011) 'The role of customer co-production in value creation', In *Proceedings of the Naples Forum on Service, Capri, Italy*.

Jain, V., Mogaji, E., Sharma, H. and Babbili, A.S., (2022) 'A multi-stakeholder perspective of relationship marketing in higher education institutions', *Journal of Marketing for Higher Education*, pp.1-19.

Janjua, Q.R. and Ramay, M.I., (2020) 'The effect of co-creation of value on service quality-Customer loyalty chain and the role of relationship quality in higher education institutions', *Journal of Business & Economics*, 12(1), pp.125-147.

Janjua, Q.R., Mehmood, A.M., and Akram, M., (2021) 'The Influence of Organizational Assimilation on Trust and Commitment with the Mediating Role of Co-creation of Value in HEIs', *Journal of Development and Social Sciences*, 2(111), pp.334-352.

Janssen, O., (2000) 'Job demands, perceptions of effort-reward fairness and innovative work behaviour', *Journal of Occupational and Organizational Psychology*, 73(3), pp.287-302.

Janssens, W., Wijnen, K., Pelsmacker, P.D. and Kenhove, P.V., (2008) *Marketing Research with SPSS.* Essex: Pearson Education.

Jasanoff, S., (2004) 'The idiom of co-production', In *States of Knowledge* (pp. 12-23). Routledge.

Järvelin, A.M. and Hyvärinen, J., (2019) 'Case study on TUTL-New Business from Research Ideas, Finland: Contribution to the OECD TIP Knowledge Transfer and Policies project'. Available at: https://stip.oecd.org/assets/TKKT/CaseStudies/8.pdf (Accessed: 10 September 2022).

Jebarajakirthy, C., Saha, V., Goyal, P. and Mani, V., (2021) 'How do value Co-creation and E-engagement enhance E-commerce consumer repurchase intention?: an empirical analysis', *Journal of Global Information Management (JGIM)*, 30(5), pp.1-23.

Jenkins, S., (2023) *British universities can no longer financially depend on foreign students. They must reform to survive*. Available at: https://www.theguardian.com/commentisfree/2023/jun/02/british-universities-foreign-students-deficits-government-higher-education (Accessed: 15 June 2023).

Jhantasana, C., (2023) 'Effects of Value Co-Creation on Student Loyalty, Satisfaction, and University Image: A Case Study of an Anonymous Rajabhat University', *Asia Social Issues*, 16(1), pp.e254659-e254659.

Jiang, X., Mastromartino, B., Yang, Q., Zhang, J. and Zhang, J.J., (2022) 'Influence of Consumer Interaction and Community Relationships on Value Co-Creation Willingness: A Mediation Model of Chinese Sports Brands', *Sustainability*, 15(1), p.115.

Jin, R. and Chen, K., (2020) 'Impact of value cocreation on customer satisfaction and loyalty of online car-hailing services', *Journal of theoretical and applied electronic commerce research*, 16(3), pp.432-444.

Jiya, T., (2021) 'Using Theory of Change to evaluate the role of stakeholder engagement towards socially desirable outcomes in ICT research projects', *International Journal of Information Systems and Project Management*, 9(2), pp.63-82.

Jo, S. and Nabatchi, T., (2018) 'Co-production, co-creation, and citizen empowerment', In *Co-production and co-creation* (pp. 231-239). Routledge.

Johari, J., Yahya, K.K., Che Mit, D.A. and Omar, A., (2011) 'The dimensions of job charateristics: A validation study in a Malaysian context', *International Business Management*, 5(2), pp.91-103.

Johnston, J.M. and Ryan, B., (2022) 'From Students-as-Partners theory to Students-as-Partners practice: reflecting on staff-student collaborative partnership in an academic development context', *All Ireland Journal of Higher Education*, 14(1).

Jones, P., (2018) 'Contexts of co-creation: Designing with system stakeholders', *Systemic design: Theory, methods, and practice*, pp.3-52.

Jones, P.M., (2010) 'Developing social capital: A role for music education and community music in fostering civic engagement and intercultural understanding', *International Journal of Community Music*, 3(2), pp.291-302.

Jöreskog, K.G. and *Sörbom, D.*, (1984) *Lisrel-VI user's guide.* 3 ed. Mooresville: Scientific Software.

Josè, Q.G.M., Montserrat, D.M. and Evert, G., (2021) 'Co-patenting and co-ownership as drivers for university business innovating: The case of public universities in Spain', *The 2021 Naples forum on service: A service lense on changing business and society.*

Judge, W.Q. and Miller, A., (1991) 'Antecedents and outcome of decision speed in different environmental contexts', *Academy of Management Journal,* 34(2), pp. 449-463.

Julien, C., (2015) 'Bourdieu, social capital and online interaction', *Sociology*, 49(2), pp.356-373.

Kahu, E.R. and Nelson, K., (2018) 'Student engagement in the educational interface: Understanding the mechanisms of student success', *Higher education research & development*, 37(1), pp.58-71.

Kakilla, C., (2021) Strengths and weaknesses of semi-structured Interviews in Qualitative research: A critical essay.

Kállay, B., (2012) 'Evolutionary and competence-based theories of the firm', *Journal of International Studies*, 5(1).

Kaloudis, A., Aspelund, A., Koch, P.M., Lauvås, T.A., Mathisen, M.T., Strand, Ø., Sørheim, R. and Aadland, T., (2019) 'How universities contribute to innovation: A literature review-based analysis', *Norwegian University of Science and Technology.*

Kantola, J., Karwowski, W. and Vanharanta, H., (2005) 'Creative tension in occupational work roles: a dualistic view of human competence management methodology based on soft computing', *Ergonomia IJE & HF*, 27(4), pp.273-286.

Kasule, G.W., Wesselink, R., Noroozi, O. and Mulder, M., (2015) 'The current status of teaching staff innovation competence in Ugandan universities: perceptions of managers, teachers, and students', *Journal of Higher Education Policy and Management*, 37(3), pp.330-343.

Kazadi, K., Lievens, A. and Mahr, D., (2016) 'Stakeholder co-creation during the innovation process: Identifying capabilities for knowledge creation among multiple stakeholders', *Journal of Business Research*, 69(2), pp.525-540.

Keegan, H. and Bell, F., (2011) 'YouTube as a repository: the creative practice of students as producers of Open Educational Resources', *European Journal of Open, Distance and E-learning*, 14(2).

Keinänen, M. and Kairisto-Mertanen, L., (2019) 'Researching learning environments and students' innovation competences', *Education+ Training*, 16(1), pp.17-30.

Keinänen, M., Ursin, J. and Nissinen, K., (2018) 'How to measure students' innovation competences in higher education: Evaluation of an assessment tool in authentic learning environments', *Studies in Educational Evaluation*, 58, pp.30-36.

Ketonen-Oksi, S. and Valkokari, K., (2019) 'Innovation ecosystems as structures for value co-creation' *Technology Innovation Management Review*, *9*(2).

Kettunen, J., (2016) 'Open Innovation Alliances and Communities in Higher Education', *Business Education & Accreditation*, 8(1), pp.15-26.

Khodijah, S., (2018) 'Strategy for increasing the students' interpersonal communication skills through problem-based learning', *International Journal of Educational Research Review*, 3(4), pp.150-158.

Kivunja, C. and Kuyini, A.B., (2017) 'Understanding and applying research paradigms in educational contexts', *International Journal of Higher Education*, 6(5), pp.26-41.

Kivimaa, P., Boon, W. and Antikainen, R., (2017) 'Commercialising university inventions for sustainability—a case study of (non-) intermediating 'cleantech'at Aalto University', *Science and Public Policy*, 44(5), pp.631-644.

Kleinschmidt, E.J., De Brentani, U. and Salomo, S., (2007) 'Performance of global new product development programs: a resource-based view', *Journal of Product Innovation Management*, 24(5), pp.419-441.

Kline, R.B., (1998) *Principles and Practice of Structural Equation Modeling.* New York: The Guilford Press.

Kline, R.B., (2011) 'Convergence of structural equation modelling and multilevel modelling', In: M. Williams & W. P. vogt, eds. *Handbook of methodological innovation.* Thousand Oaks: Sage, pp.562-589.

Kodama, M., (2007) *Project-based Organization in the Knowledge-based Society* (Vol. 12). World Scientific.

Kohli, R. and Grover, V., (2008) 'Business value of IT: An essay on expanding research directions to keep up with the times', *Journal of the Association for Information Systems*, 9(1), p.1.

Könings, K.D., Mordang, S., Smeenk, F., Stassen, L. and Ramani, S., (2021) 'Learner involvement in the co-creation of teaching and learning: AMEE Guide No. 138', *Medical Teacher*, 43(8), pp.924-936.

Kopelyan, S., Godonoga, A., Güney, I. and Yasmin, N., (2016) 'Assessing innovation-related competences in the MaRIHE program: Teacher and student perceptions', *Procedia-Social and Behavioral Sciences*, 228, pp.553-560.

Krskova, H. and Breyer, Y.A., (2023) 'The influence of growth mindset, discipline, flow and creativity on innovation: Introducing the MDFC model of innovation', *Heliyon*, 9(3).

Kruger, S. and Steyn, A.A., (2021) 'A conceptual model of entrepreneurial competencies needed to utilise technologies of Industry 4.0', *The International Journal of Entrepreneurship and Innovation*, 22(1), pp.56-67.

Kujala, J., Lehtimäki, H. and Freeman, E.R., (2019) 'A stakeholder approach to value creation and leadership', *Leading change in a complex world: Transdisciplinary perspectives*.

Kunneman, Y., Alves da Motta-Filho, M. and van der Waa, J., (2022) 'Data science for service design: An introductory overview of methods and opportunities', *The Design Journal*, 25(2), pp.186-204.

Kutz, D., Cumbie, B. and Mullarkey, M., (2022) 'Incorporating the student perspective in designing a virtual team classroom environment: an elaborated action design science research approach', *Journal of Research in Innovative Teaching & Learning*, (ahead-of-print).

Kwan, J.L. and Chan, W., (2014) 'Comparing squared multiple correlation coefficients using structural equation modeling', *Structural Equation Modeling: A Multidisciplinary Journal*, 21(2), pp.225-238.

Lan, J., Ma, Y., Zhu, D., Mangalagiu, D. and Thornton, T.F., (2017) 'Enabling value co-creation in the sharing economy: The case of mobike', *Sustainability*, 9(9), p.1504.

Langrafe, T.D.F., Barakat, S.R., Stocker, F. and Boaventura, J.M.G., (2020) 'A stakeholder theory approach to creating value in higher education institutions', *The Bottom Line*, 33(4), pp.297-313.

Lee, M.J., McLoughlin, C. and Chan, A., (2008) 'Talk the talk: Learner-generated podcasts as catalysts for knowledge creation', *British Journal of Educational Technology*, 39(3), pp.501-521.

Lee, T.W., (1999) *Using qualitative methods in organizational research*. Sage.

Lee, H.H.M. and van Dolen, W. (2015) 'Creative participation: collective sentiment in online co-creation communities', *Information & Management*, 52(8), pp. 951-964.

Lee, S.M., Olson, D.L. and Trimi, S., (2012) 'Co-innovation: convergenomics, collaboration, and co-creation for organizational values', *Management Decision*, 50(5), pp.817-831.

Lee, Y.Y., Koo, W.L., Tan, Y.F., Seet, V., Subramaniam, M., Ang, S. and Tang, C., (2022) 'A Mixed-Methods Outcomes Evaluation Protocol for a Co-Produced Psychoeducation Workshop Series on Recovery from Psychosis', *International Journal of Environmental Research and Public Health*, 19(23), p.15464.

Leedy, P.D. and Ormrod, J.E., (2005) *Practical research* (Vol. 108). Saddle River, NJ, USA: Pearson Custom.

Leem, B.H., (2021) 'An effect of value co-creation on student benefits in COVID-19 pandemic', *International Journal of Engineering Business Management*, 13, p.18479790211058320.

Lei, J. and Hock, O.Y., (2020) 'A Mixed-Method Study on Innovation Capability Enhancing through Entrepreneurial Education: New Normal Perspective', *International Journal of Academic Research in Economics & Management Sciences*, 9(3), pp.1-20.

Lei, M. and Lomax, R.G., (2005) 'The effect of varying degrees of Nonnormality in structural equation modeling', *Structural Equation Modeling: A Multidisciplinary Journal*, 12(1), 1-27.

Lehtinen, E., Hakkarainen, K. and Palonen, T., (2014) 'Understanding learning for the professions: How theories of learning explain coping with rapid change', *International handbook of research in professional and practice-based learning*, pp.199-224.

Lemke, F., Clark, M. and Wilson, H., (2011) 'Customer experience quality: an exploration in business and consumer contexts using repertory grid technique', *Journal of the Academy of Marketing Science*, 39, pp.846-869.

Lemon, K.N. and Verhoef, P.C., (2016) 'Understanding customer experience throughout the customer journey', *Journal of Marketing*, 80(6), pp.69-96.

Lepistö, J. and Lindfors, E., (2015) 'From gender-segregated subjects to multi-material craft: Craft student teachers' views on the future of the craft subject', *Formakademisk*, 8(3), pp.1-20.

Lewis, M., Brandon-Jones, A., Slack, N. and Howard, M., (2010) 'Competing through operations and supply: The role of classic and extended resource-based advantage', *International Journal of Operations & Production Management*, 30(10), pp.1032-1058.

Li, L., Bai, X. and Zhou, Y., (2023) 'A Social Resources Perspective of Employee Innovative Behavior and Outcomes: A Moderated Mediation Model', *Sustainability*, 15(3), p.2669.

Liang, X., Hu, X., Li, E.Y. and Meng, H., (2023) 'Untangling the influence of perceived sustainability orientation on value-co-creation behavior in crowdfunding process: investigating a mediation model', *Internet Research*, (ahead-of-print).

Lin, N., (2008) 'A network theory of social capital', *The handbook of social capital*, 50(1), p.69.

Lin, Z., Chen, Y. and Filieri, R. (2017) 'Resident-tourist value co-creation: the role of residents' perceived tourism impacts and life satisfaction', *Tourism Management*, 61, pp. 436-442.

Lipponen, L. and Kumpulainen, K., (2011) 'Acting as accountable authors: Creating interactional spaces for agency work in teacher education', *Teaching and Teacher Education*, 27(5), pp.812-819.

Little, R.J.A. and Rubin, D.B., (1987) *Statistical Analysis With Missing Data.* New York: John Wiley and Sons.

Liu, J., (2022) 'Factors influencing willingness to use fitness apps during COVID-19 pandemic: evidence from China', In *MATEC Web of Conferences* (Vol. 355, p. 02053). EDP Sciences.

Loeffler, E. and Bovaird, T., (2018) 'Assessing the effect of co-production on outcomes, service quality and efficiency', In *Co-production and co-creation* (pp. 269-280). Routledge.

Lončarić, D., Prodan, M. and Bagarić, L., (2018) 'THE RELATIONSHIP BETWEEN TOURISM EXPERIENCE CO-CREATION, LIFE SATISFACTION AND BEHAVIOURAL INTENTIONS', *Central European Business Review*, 7(4).

Loonam, J., Eaves, S., Kumar, V. and Parry, G., (2018) 'Towards digital transformation: Lessons learned from traditional organizations', *Strategic Change*, *27*(2), pp.101-109.

Loughlin, N., (2012) 'The benefits and disadvantages of post-positivism in international theory', *E-International Relations*.

Lubicz-Nawrocka, T., (2017) 'Co-Creation of the Curriculum: Challenging the Status Quo to Embed Partnership', *The Journal of Educational Innovation, Partnership and Change*, 3(2), pp.1-14.

Lubicz-Nawrocka, T., (2019) 'Creativity and collaboration: An exploration of empathy, inclusion, and resilience in co-creation of the curriculum', *Student Engagement in Higher Education Journal*, 2(3), pp.199-213.

Lukács J, Á. and Dávid, B., (2019) 'Roma undergraduates' personal network in the process of college transition. A social capital approach', *Research in Higher Education*, 60, pp.64-82.

Lukes, M. and Stephan, U., (2017) 'Measuring employee innovation: A review of existing scales and the development of the innovative behavior and innovation support inventories across cultures', *International Journal of Entrepreneurial Behavior & Research*, 23(1), pp.136-158.

Lusch, R.F., and Vargo, S.L. (2006) 'Service-dominant logic: reactions, reflections and refinements', *Marketing Theory*, 6(3), pp. 281-288.

Macdonald, E.K., Wilson, H., Martinez, V. and Toossi, A., (2011) 'Assessing value-in-use: A conceptual framework and exploratory study', *Industrial Marketing Management*, *40*(5), pp.671-682.

Macinko, J. and Starfield, B., (2001) 'The utility of social capital in research on health determinants', *The Milbank Quarterly*, 79(3), pp.387-427.

Mack, L., (2010) 'The philosophical underpinnings of educational research', *Polyglossia*, 19, pp.5-11.

Mah, D.K. and Ifenthaler, D., (2018) 'Students' perceptions toward academic competencies: The case of German first-year students', *Issues in Educational Research*, 28(1), pp.120-137.

Malik, A.M., Akbar, M.I.U.D., Ullah, S. and Akram, J., (2022) 'Value Co-creation in Vocational Education: A Service Model Framework', *Journal of ISOSS*, 8(1), pp.273-290.

Mannell, J., Washington, L., Khaula, S., Khoza, Z., Mkhwanazi, S., Burgess, R.A., Brown, L.J., Jewkes, R., Shai, N., Willan, S. and Gibbs, A., (2023) 'Challenges and opportunities in coproduction: reflections on working with young people to develop an intervention to prevent violence in informal settlements in South Africa', *BMJ Global Health*, 8(3), p.e011463.

Marín-García, J.A., Andreu-Andrés, M.Á., Atares-Huerta, L., Aznar-Mas, L.E., Garcia-Carbonell, A., González-Ladrón-de-Guevara, F., Fleta, B.M., Perez-Peñalver, M.J. and Watts, F., (2016) 'Proposal of a framework for innovation competencies development and assessment (FINCODA)', *WPOM-Working Papers on Operations Management*, 7(2), pp.119-126.

Marín-García, J.A., Pérez Peñalver, M.J. and Watts Hooge, F.I., (2013) 'How to assess innovation competence in services: The case of university students', *Dirección y Organización*, (50), pp.48-52.

Marcos-Cuevas, J., Nätti, S., Palo, T. and Baumann, J., (2016) 'Value co-creation practices and capabilities: Sustained purposeful engagement across B2B systems', *Industrial Marketing Management*, 56, pp.97-107.

Martela, F., and Ryan, R.M. (2016) 'The benefits of benevolence: Basic psychological needs, beneficence, and the enhancement of well-being', *Journal of Personality*, 84(6), pp.750–764.

Martí, I. and Fernández, P., (2013) 'The institutional work of oppression and resistance: Learning from the Holocaust', *Organization Studies*, 34(8), pp.1195-1223.

Masip, L., Oliva, M. and Granollers, T., (2011) 'User experience specification through quality attributes', In *Human-Computer Interaction–INTERACT 2011: 13th IFIP TC 13 International Conference, Lisbon, Portugal, September 5-9, 2011, Proceedings, Part IV 13* (pp. 656-660). Springer Berlin Heidelberg.

Masterson, D., Areskoug Josefsson, K., Robert, G., Nylander, E. and Kjellström, S., (2022) 'Mapping definitions of co-production and co-design in health and social care: A systematic scoping review providing lessons for the future', *Health Expectations*, 25(3), pp.902-913.

Mathisen, L. and Jørgensen, E.J., (2021) 'The significance of knowledge readiness for co-creation in university industry collaborations' *Innovation*, 23(4), pp.534-551.

Matthews, K.E., Dwyer, A., Russell, S. and Enright, E., (2019) 'It is a complicated thing: Leaders' conceptions of students as partners in the neoliberal university', *Studies in Higher Education*, 44(12), pp.2196-2207.

Maxwell-Stuart, R., Taheri, B., Paterson, A.S., O'Gorman, K. and Jackson, W., (2018) 'Working together to increase student satisfaction: exploring the effects of mode of study and fee status', *Studies in Higher Education*, 43(8), pp.1392-1404.

Mcdonald, A., McGowan, H., Dollinger, M., Naylor, R. and Khosravi, H., (2021) 'Repositioning students as co-creators of curriculum for online learning resources', *Australasian Journal of Educational Technology*, 37(6), pp.102-118.

McLellan, R. and Nicholl, B., (2011) '"If I was going to design a chair, the last thing I would look at is a chair": Product analysis and the causes of fixation in students' design work 11–16 years', *International Journal of Technology and Design Education*, 21, pp.71-92.

McMullin, C., (2023) 'The Persistent Constraints of New Public Management on Sustainable Co-Production between Non-Profit Professionals and Service Users', *Administrative Sciences*, 13(2), p.37.

McPhillips, M., Nikitina, T., Tegtmeier, S. and Wójcik, M., (2022) 'What Skills for Multi-Partner Open Innovation Projects? Open Innovation Competence Profile in a Cluster Ecosystem Context', *Sustainability*, 14(20), p.13330.

Medberg, G. and Grönroos, C., (2020) 'Value-in-use and service quality: do customers see a difference?', *Journal of Service Theory and Practice*, 30(4/5), pp.507-529.

Mehmetoglu, M. and Engen, M., (2011) 'Pine and Gilmore's concept of experience economy and its dimensions: An empirical examination in tourism', *Journal of Quality Assurance in Hospitality & Tourism*, 12(4), pp.237-255.

Mele, C., Colurcio, M. and Spena, T.R., (2011) 'Service-Dominant Logic as a Framework for Innovation within Networks', *Available at SSRN 1934862*.

Melnick, E.L., Nayyar, P.R., Pinedo, M.L. and Seshadri, S., (2000) 'Creating value in financial services', *Creating Value in Financial Services: Strategies, Operations and Technologies*, pp.1-20.

Mercer-Mapstone, L., Marquis, E., & McConnell, C., (2018) 'The 'Partnership Identity' in Higher Education: Moving from 'Us' and 'Them' to 'We' in Student-Staff Partnership', *Student Engagement in Higher Education Journal*, 2(2), pp.12–29.

Mertens, D.M., (2008) *Transformative research and evaluation*. Guilford press.

Meyer, J.P. and Gagne, M., (2008) 'Employee engagement from a self-determination theory perspective', *Industrial and organizational psychology*, 1(1), pp.60-62.

Micheal, S. and Marjadi, B., (2018) 'Blended learning to teach gender in medical school', *The Clinical Teacher*, 15(3), pp.208-213.

Michel, S., Brown, S.W. and Gallan, A.S., (2008) 'An expanded and strategic view of discontinuous innovations: deploying a service-dominant logic', *Journal of the academy of marketing science*, 36, pp.54-66.

Miles, S., Renedo, A. and Marston, C., (2018) 'Slow co-production' for deeper patient involvement in health care', *The Journal of Health Design*, 3(1).

Mill, J.S., (1965) *Principles of political economy*. Рипол Классик.

Miller, C.A. and Wyborn, C., (2020) 'Co-production in global sustainability: Histories and theories', *Environmental Science & Policy*, 113, pp.88-95.

Miller, L., (2015) 'Value creation: The role of values in improving organizational performance', *Eruditio*, 1(6), pp.55-67.

Miller, L. (2016) 'A Theoretical Framework for Value Creation: A Multidimensional Strategy/Model for Improving Social Economic Performance', *Journal of Creating Value*, 2(2), pp. 257–267.

Miller, L. (2022) *The theory and practice of value creation*, Newcastle upon Tyne: Cambridge Scholars Publishing.

Moise, M.S., Gil-Saura, I. and Ruiz-Molina, M.E., (2020) 'Implications of value co-creation in green hotels: the moderating effect of trip purpose and generational cohort', *Sustainability*, 12(23), p.9866.

Moonti, A., Panjaitan, R., Adam, E. and Roslan, A.H., (2023) 'Linkages nascent entrepreneurship and knowledge quality resonance: explore voluntary co-creation from service dominant logic', *Business: Theory and Practice*, 24(1), pp.1-12.

Morgan, H., (2022) 'Understanding Thematic Analysis and the Debates Involving Its Use', *Qualitative Report*, 27(10), pp.2079-2090.

Morgan, M., Elbe, J. and de Esteban Curiel, J., (2009) 'Has the experience economy arrived? The views of destination managers in three visitor-dependent areas', *International Journal of Tourism Research*, 11(2), pp.201-216.

Mu, J., Thomas, E., Peng, G. and Di Benedetto, A., (2017) 'Strategic orientation and new product development performance: The role of networking capability and networking ability', *Industrial Marketing Management*, 64, pp.187-201.

Mulder, M., (2012) 'Competence-based education and training', *The Journal of Agricultural Education and Extension*, 18(3), 305–314.

Mulder, M. and Gulikers, J., (2011) 'Workplace learning in East Africa: A case study', *The SAGE handbook of workplace learning*, pp.307-318.

Mulder, M., Lans, T., Verstegen, J., Biemans, H. and Meijer, Y., (2007) 'Competence development of entrepreneurs in innovative horticulture', *Journal of Workplace Learning*, 19(1), pp.32-44.

Muringani, J., Fitjar, R.D. and Rodríguez-Pose, A., (2021) 'Social capital and economic growth in the regions of Europe', *Environment and Planning A: Economy and Space*, 53(6), pp.1412-1434.

Murray, M., (2003) 'Narrative psychology', In J. A. Smith (Ed.), *Qualitative psychology: A practical guide to research methods* (pp.111-131). London: Sage.

Murphy, R., Nixon, S., Brooman, S. and Fearon, D., (2017) '"I am wary of giving too much power to students:" Addressing the "but" in the Principle of Staff-Student Partnership', *International Journal for Students as Partners*, 1(1).

Mutuli, L. A. and Bukhala, P., (2020) 'Applicability of structural equation modeling in practice of optimal dietary intake amongst recuperating alcoholics', *Journal of Alcoholism & Drug Dependence*, 8(4).

Muukkonen, H., Lakkala, M., Kaistinen, J. and Nyman, G., (2010) 'Knowledge creating inquiry in a distributed project-management course', *Research and Practice in Technology Enhanced Learning*, 5(02), pp.73-96.

Nabatchi, T., Sancino, A. and Sicilia, M., (2017) 'Varieties of participation in public services: The who, when, and what of coproduction', *Public administration review*, 77(5), pp.766-776.

Neary, M., Saunders, G., Hagyard, A. and Derricott, D., (2014) 'Student as producer: Research-engaged teaching, an institutional strategy', *Higher Education Academy*. Available at: https://eprints.lincoln.ac.uk/id/eprint/14789/1/14789%20lincoln_ntfs_2010_project_final_report_fv.pdf (Accessed: 10 September 2022).

Needham, C. and Carr, S., (2009) *Co-production: an emerging evidence base for adult social care transformation*. Social Care Institute for Excellence.

Nietzel, M.T., (2023) *Depaul, West Virginia Universities Latest Institutions to Face Large Budget Deficits.* Available at: https://www.forbes.com/sites/michaeltnietzel/2023/04/19/depaul-west-virginia-university-latest-large-institutions-to-face-major-budget-deficits/?sh=4f1702b87fc4 (Accessed: 1 June 2023).

Niyungeko, A., (2022) 'Evaluating Starting a Business Indicators Innovation in the World', *Management & Economics Research Journal*, 4(1), pp.1-17.

Nguyen, L.T.K., Lin, T.M. and Lam, H.P., (2021) 'The role of co-creating value and its outcomes in higher education marketing', *Sustainability*, 13(12), p.6724.

Nueesch, R., Puschmann, T. and Alt, R., (2014) 'Realizing Value From Tablet-Supported Customer Advisory: Cases From the Banking Industry', *Bled eConference*, p.*34*.

Nunes, G.C., Milan, G.S., Eberle, L., Toni, D.D. and Olea, P.M., (2021) 'Co-creation, value-in-use, satisfaction, and switching costs as antecedents of higher education students retention', *Revista de Administração da UFSM*, 14, pp.545-567.

Nystrand, M., Gamoran, A., (1991) 'Instructional discourse, student engagement and literature achievement', *Research in the Teaching of English*, 25(3), pp.261–290.

Oesterle, S., Buchwald, A. and Urbach, N., (2020) 'Investigating the co-creation of IT consulting service value: empirical findings of a matched pair analysis', *Electronic Markets*, pp.1-27.

Ogunsakin, I.B., (2022) 'Assessing the internal structure of mathematics achievement test for junior secondary school students in Osun state', *Al-Hikmah Journal of Arts & Social Sciences Education*, 4(1), pp.81-88.

Oliver, V., (2010) *301 smart answers to tough business etiquette questions*. Skyhorse Publishing Inc.

Osborne, S.P. and Strokosch, K., (2013) 'It takes Two to Tango? Understanding the Co-production of Public Services by Integrating the Services Management and Public Administration Perspectives', *British Journal of Management*, 24, pp.S31-S47.

Osborne, S.P., Powell, M., Cui, T. and Strokosch, K., (2022) 'Value creation in the public service ecosystem: An integrative framework', *Public Administration Review*, *82*(4), pp.634-645.

Osborne, S.P., Radnor, Z. and Strokosch, K., (2016) 'Co-production and the co-creation of value in public services: a suitable case for treatment?' *Public management review*, *18*(5), pp.639-653.

Osborne, S.P., Strokosch, K. and Radnor, Z., (2018) 'Co-production and the co-creation of value in public services: A perspective from service management 1', In *Co-production and co-creation* (pp. 18-26). Routledge.

Osorno-Hinojosa, R., Koria, M. and Ramírez-Vázquez, D.D.C., (2022) 'Open Innovation with Value Co-Creation from University–Industry Collaboration', *Journal of Open Innovation: Technology, Market, and Complexity*, *8*(1), p.32.

Ostrom, E., (1996) 'Crossing the great divide: coproduction, synergy, and development', *World development*, *24*(6), pp.1073-1087.

Ostrom, E., (2005) 'Doing institutional analysis digging deeper than markets and hierarchies', In *Handbook of new institutional economics*, pp.819-848.

Ovbiagbonhia, A.R., Kollöffel, B. and Brok, P.D., (2019) 'Educating for innovation: Students' perceptions of the learning environment and of their own innovation competence', *Learning environments research*, *22*, pp.387-407.

Özbağ, G.K., (2013) 'Resource based view, core competence and innovation: A research on Turkish manufacturing industry', *Scientific Research Journal*, *1*(3), pp.9-17.

Pallant, J., (2020) *SPSS survival manual: A step by step guide to data analysis using IBM SPSS*. McGraw-hill education (UK).

Park, J.H. and Shin, H.D., (2021) 'Social bricolage in the arts: Cheongna International City Culture Art Academy case', *Journal for International Business and Entrepreneurship Development*, *13*(1), pp.114-126.

Parker, S. and Gallivan, C., (2011) 'Sampling versus census: A comparative analysis', *TNS Employee Insights Report*.

Parks, R.B., Baker, P.C., Kiser, L., Oakerson, R., Ostrom, E., Ostrom, V., Percy, S.L., Vandivort, M.B., Whitaker, G.P. and Wilson, R., (1981) 'Consumers as coproducers of public services: Some economic and institutional considerations', *Policy studies journal*, *9*(7), pp.1001-1011.

Parry, G., Bustinza, O.F. and Vendrell-Herrero, F., (2012) 'Servitisation and value co-production in the UK music industry: an empirical study of consumer attitudes', *International Journal of Production Economics*, *135*(1), pp.320-332.

Pathak, B., Ashok, M. and Leng Tan, Y., (2022) 'Value co-creation in the B2B context: a conceptual framework and its implications', *The Service Industries Journal*, 42(3-4), pp.178-205.

Patterson, F., Kerrin, M. and Gatto-Roissard, G., (2009) 'Characteristics and behaviours of innovative people in organisations', *Literature review prepared for the NESTA Policy & Research Unit*, pp.1-63.

Payne, A.F., Storbacka, K. and Frow, P., (2008) 'Managing the co-creation of value', *Journal of the academy of marketing science*, *36*, pp.83-96.

Payne, A., Storbacka, K., Frow, P. and Knox, S., (2009) 'Co-creating brands: Diagnosing and designing the relationship experience', *Journal of business research*, *62*(3), pp.379-389.

Pedersen, K., (2020) 'What can open innovation be used for and how does it create value?', *Government Information Quarterly*, *37*(2), p.101459.

Penttilä, T., (2016) 'Developing educational organizations with innovation pedagogy', *International e-journal of Advances in Education*, *2*(5), pp.259-267.

Penttilä, T. and Kairisto-Mertanen, L., (2012) 'Innovation Competence Barometer ICB-A Tool for Assessing Students' Innovation Competences as Learning Outcomes in Higher Education', In *INTED2012 Proceedings* (pp. 6347-6351). IATED.

Penttilä, T., Kairisto-Mertanen, L., Putkonen, A. and Nuotio, J., (2011) 'Innovation pedagogical approach–strategic viewpoints', In *INTED2011 Proceedings* (pp. 4513-4518). IATED.

Peschl, M.F., Bottaro, G., Hartner-Tiefenthaler, M. and Rötzer, K., (2014) 'Learning how to innovate as a socio-epistemological process of co-creation. Towards a constructivist teaching strategy for innovation', *Constructivist Foundations*, 3(9), pp.421-433.

Pestoff, V. and Brandsen, T. eds., (2013) *Co-production: the third sector and the delivery of public services*. Routledge.

Pham, H.L., Pham, T. and Nguyen, T.T., (2022) 'Value co-creation in branding: A systematic review from a tourism perspective', *European Journal of Tourism Research*, *32*, pp.3203-3203.

Phan, P., Zhou, J. and Abrahamson, E., (2010) 'Creativity, innovation, and entrepreneurship in China', *Management and Organization Review*, 6(2), pp.175-194.

Plewa, C., Sweeney, J.C. and Michayluk, D., (2015) 'Determining value in a complex service setting', *Journal of Service Theory and Practice*, 25(5), pp.568-591.

Vijayamohanan, V.N. and Asalatha, R., (2020) 'Reliability, validity and uni-dimensionality: a primer', *Munich Personal RePEc Archive (MPRA).*

Phillips, D.C. and Burbules, N.C., (2000) *Postpositivism and educational research*. Lanham, MD: Rowman & Littlefield.

Phillips, R., Freeman, R.E. and Wicks, A.C., (2003) 'What stakeholder theory is not', *Business ethics quarterly*, 13(4), pp.479-502.

Pinar, M., Trapp, P., Girard, T., and Boyt, T. E., (2011) 'Utilizing the brand ecosystem framework in designing branding strategies for higher education', *International Journal of Educational Management*, 25(7), pp.724-739.

Pine, B.J. and Gilmore, J.H., (1998) *Welcome to the experience economy* (Vol. 76, No. 4, pp. 97-105). Harvard Business Review Press.

Pine, B.J. and Gilmore, J.H., (2011) *The experience economy*. Harvard Business Press.

Pine, B.J. and Gilmore, J.H., (2013) 'The experience economy: past, present and future', In *Handbook on the experience economy*. Edward Elgar Publishing.

Pini, F.M., (2009) 'The role of customers in interactive co-creation practices: The Italian scenario', *Knowledge, Technology & Policy*, 22, pp.61-69.

Pinna, R., Cicotto, G. and Jafarkarimi, H., (2023) 'Student's Co-Creation Behavior in a Business and Economic Bachelor's Degree in Italy: Influence of Perceived Service Quality, Institutional Image, and Loyalty', *Sustainability*, 15(11), p.8920.

Pique, J.M., Berbegal-Mirabent, J. and Etzkowitz, H., (2018) 'Triple Helix and the evolution of ecosystems of innovation: the case of Silicon Valley', *Triple Helix*, *5*(1), pp.1-21.

Podsakoff, P.M., MacKenzie, S.B., Lee, J.Y. and Podsakoff, N.P., (2003) 'Common method biases in behavioral research: a critical review of the literature and recommended remedies', *Journal of applied psychology*, 88(5), p.879.

Polk, M., (2015) 'Transdisciplinary co-production: Designing and testing a transdisciplinary research framework for societal problem solving', *Futures*, 65, pp.110-122.

Popper, K.R., (2002a) *The Logic of Scientific Discovery*. London: Routledge.

Popper, K.R., (2002b) *Conjectures and Refutations*. London: Routledge.

Porter, A., (2023) *More than 100,000 students try to sue universities over disruption to their studies.* Available at: https://news.sky.com/story/more-than-100-000-students-try-to-sue-universities-over-disruption-to-their-studies-12887980 (Accessed: 1 June 2023).

Portes, A., (1998), 'Social capital: Its origins and applications in modern sociology', *Annual review of sociology*, 24(1), pp.1-24.

Potter, J. and Wetherell, M., (1987) *Discourse and social psychology: Beyond attitudes and behaviour*. London: Sage.

Prahalad, C.K. and Ramaswamy, V., (2000) 'Co-opting customer competence', *Harvard Business Review*, 78(1), pp.79-90.

Prahalad, C.K. and Ramaswamy, V., (2002) 'The co-creation connection', *Strategy and Business*, pp.50-61.

Prahalad, C.K. and Ramaswamy, V., (2003) 'The new frontier of experience innovation', *MIT Sloan management review*, 44(4), pp.12-18.

Prahalad, C.K. and Ramaswamy, V., (2004a) 'Co-creating unique value with customers', *Strategy & Leadership*, 32(3), pp.4-9.

Prahalad, C.K. and Ramaswamy, V., (2004b) 'Co-creation experiences: The next practice in value creation', *Journal of Interactive Marketing*, 18(3), pp.5-14.

Prahalad, C.K. and Ramaswamy, V., (2004c) *The future of competition: Co-creating unique value with customers*. Harvard Business Press.

Prebensen, N.K. and Foss, L., (2011) 'Coping and co-creating in tourist experiences', *International Journal of Tourism Research*, 13(1), pp.54-67.

Prebensen, N.K., Kim, H. and Uysal, M., (2016) 'Cocreation as moderator between the experience value and satisfaction relationship', *Journal of Travel Research*, 55(7), pp.934-945.

Preikschas, M.W., Cabanelas, P., Rüdiger, K. and Lampón, J.F., (2017) 'Value co-creation, dynamic capabilities and customer retention in industrial markets', *Journal of Business & Industrial Marketing*, 32(3), pp.409-420.

Price, A., (2019) *Building bridges to improve co-production in trials and its reporting/ a mixed methods research analysis* (Doctoral dissertation, University of Oxford).

Prinsen, G. and Nijhof, S., (2015) 'Between logframes and theory of change: reviewing debates and a practical experience', *Development in Practice*, 25(2), pp.234-246.

Purwanto, A. and Sudargini, Y., (2021) 'Partial least squares structural squation modeling (PLS-SEM) analysis for social and management research: a literature review', *Journal of Industrial Engineering & Management Research*, 2(4), pp.114-123.

Putnam, R.D., Leonardi, R. and Nanetti, R.Y., (1993) *Making democracy work: Civic traditions in modern Italy*. Princeton university press.

Rafique, G.M. and Mahmood, K., (2018) 'Relationship between knowledge sharing and job satisfaction: a systematic review', *Information and Learning Science*, 119(5/6), pp.295-312.

Rahayu, C., (2023) 'The Influence of Relationship Marketing on Patient Loyalty Mediated by the Value Co-Creation Behavior of Patients at the Dental and Oral Education Hospital in Jakarta', *Journal of Social Research*, 2(3), pp.781-802.

Rahman, K., Setapa, M., Ghazali, N.A., Sahari, N. and Ramli, N.H., (2022) 'Factors Affecting Innovative Behaviours among Students in Public Higher Learning in the Southern Region in Malaysia', In *Proceedings* (Vol. 82, No. 1, p. 43). MDPI.

Ramirez, R., (1999) 'Value co-production: intellectual origins and implications for practice and research', *Strategic Management Journal*, 20(1), pp.49-65.

Ramaswamy, V. and Ozcan, K., (2014) *The co-creation paradigm*. Stanford University Press.

Ramu, P., Osman, M., Abdul Mutalib, N.A., Aljaberi, M.A., Lee, K.H., Lin, C.Y. and Hamat, R.A., (2023) 'Validity and Reliability of a Questionnaire on the Knowledge, Attitudes, Perceptions and Practices toward Food Poisoning among Malaysian Secondary School Students: A Pilot Study', *Healthcare*, 11(6), p.853.

Ranjan, K.R. and Read, S., (2016) 'Value co-creation: concept and measurement', *Journal of the Academy of Marketing Science*, 44, pp.290-315.

Ratajczak-Mrozek, M., Wieczerzycki, M. and Hauke-Lopes, A., (2021) 'Relationship and digital competencies of individuals in value creation in the Polish digitized environment', *Journal of Eastern European and Central Asian Research (JEECAR)*, 8(4), pp.463-480.

Ratcheva, V., Leopold, T.A. and Zahidi, S., (2020) February. Jobs of tomorrow: mapping opportunity in the new economy. In *World Economic Forum* (Vol. 79, No. 10).

Rautkorpi, T. and Hero, L.M., (2017) 'Promoting students' reflections in organisational improvisation arrangement between higher education and workplaces', *Nordic Journal of Vocational Education and Training*, 7(1), pp.1-22.

Raza, H., Ali, A., Rafiq, N., Xing, L., Asif, T. and Jing, C., (2023) 'Comparison of higher education in Pakistan and China: A sustainable development in student's perspective', *Sustainability*, 15(5), p.4327.

Raza, M., Khalid, R., Ivascu, L. and Kasuma, J., (2023) 'Education Beats at the Heart of the Sustainability in Thailand: The Role of Institutional Awareness, Image, Experience, and Student Volunteer Behavior', *Sustainability*, 15(2), p.918.

Raza, S., Minai, M.S. and Hashim, N.A., (2017) 'The conceptual framework in examining the influence of relationship competency on small firm performance with the mediating role of dynamic capabilities', *Journal of Business Management and Accounting*, 7(2), pp.85-92.

Redman, S., Greenhalgh, T., Adedokun, L., Staniszewska, S., Denegri, S. and Co-production of Knowledge Collection Steering Committee, (2021), 'Co-production of knowledge: the future', *BMJ*, *372*.

Remenyi, D., Williams, B., Money, A. and Swartz, E., (1998) *Doing research in business and management: an introduction to process and method*. Sage.

Ren, J., Han, Y., Genc, Y., Yeoh, W. and Popovič, A., (2021) 'The boundary of crowdsourcing in the domain of creativity', *Technological Forecasting and Social Change*, 165, p.120530.

Rhee, S.Y., Park, J. and Shin, H.D., (2020) 'High-performance work practices and organizational innovativeness: the roles of relational coordination competencies and market turbulence as a mediator or moderator', *Journal of Open Innovation: Technology, Market, and Complexity*, 6(3), p.83.

Ribes-Giner, G., Perello-Marín, M.R. and Díaz, O.P., (2016) 'Co-creation impacts on student behavior', *Procedia-Social and Behavioral Sciences*, 228, pp.72-77.

Riccomini, F.E., Cirani, C.B.S., Pedro, S.D.C., Garzaro, D.M. and Kevin, K.S., (2021) 'Innovation in educational marketing: A study applied to Brazilian private higher education institutions', *Journal of Marketing for Higher Education*, pp.1-21.

Riessman, C.K., (1993) *Narrative Analysis*. Newbury Park, CA: Sage.

Robinson, J.P., Shaver, P.R. and Wrightsman, L.S., (1991) 'Criteria for scale selection and evaluation', *Measures of Personality and Social Psychological Attitudes*, 1, pp.1-16.

Rönkkö, M. and Cho, E., (2022) 'An updated guideline for assessing discriminant validity', *Organizational Research Methods*, 25(1), pp.6-14.

Roy, S., Sivakumar, K. and Wilkinson, I.F., (2004) 'Innovation generation in supply chain relationships: A conceptual model and research propositions', *Journal of the Academy of Marketing Science*, *32*(1), pp.61-79.

Royo-Vela, M. and Velasquez Serrano, M., (2021) 'Value co-creation process and measurement in 4.0 SMEs: An exploratory research in a B2B marketing innovation context', *Administrative Sciences*, 11(1), p.20.

Ryan, R.M. and Deci, E.L., (2000) 'Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being', *American Psychologist*, 55(1), p.68.

Ryan, R.M. and Deci, E.L., (2017) *Self-determination theory: Basic psychological needs in motivation, development, and wellness*, Guilford Publications.

Ryan, R.M., Duineveld, J.J., Di Domenico, S.I., Ryan, W.S., Steward, B.A. and Bradshaw, E.L., (2022) 'We know this much is (meta-analytically) true: A meta-review of meta-analytic findings evaluating self-determination theory', *Psychological Bulletin*, 148(11-12), p.813.

Rubalcaba, L., (2022) 'Understanding Innovation in Education: A Service Co-Production Perspective', *Economies*, 10(5), p.96.

Ruskin, J. and Bilous, R.H., (2020) 'A tripartite framework for extending university-student co-creation to include workplace partners in the work-integrated learning context', *Higher Education Research & Development*, 39(4), pp.806-820.

Sadia, H. and Akbar, S., (2022) 'The impact of Value co-creation of Intellectual capital on Sustainability Practices in Higher Education Institutes in Pakistan', *City University Research Journal*, 12(2).

Saghafi, A., (2014) *Accounting theories*. (3rd ed). Iranian Accounting Association.

Saha, V., Goyal, P. and Jebarajakirthy, C., (2022) 'Value co-creation: a review of literature and future research agenda', *Journal of Business & Industrial Marketing*, 37(3), pp.612-628.

Sanina, A., Kutergina, E. and Balashov, A., (2020) 'The Co-Creative approach to digital simulation games in social science education', *Computers & Education*, 149, p.103813.

Sapsford, R. and Jupp, V., (2006) *Data Collection and Analysis*. 2nd edn ed. London: Sage.

Sari, R., Absah, Y. and Harahap, H., (2023) 'Influence Characteristics Individual and Competence to Performance with Work Placement as Variable Mediation', *Journal of World Science*, 2(1), pp.20-26.

Sarmah, B., Kamboj, S. and Rahman, Z., (2017) 'Co-creation in hotel service innovation using smart phone apps: an empirical study'*, International Journal of Contemporary Hospitality Management*, 29(10), pp.2647-2667.

Saulich, C. and Lehmann, T., (2017) 'Boosting the Employability of Students and Staff at European Higher Education Institutions: An Educational Framework for Entrepreneurship, Internationalisation and Innovation', In *Proceedings of the 3rd International Conference on Higher Education Advances* (pp. 899-907). Editorial Universitat Politècnica de València.

Saunders, M., Lewis, P. and Thornhill, A., (2016) *Research Methods for Business Students*. 7th Edition, Pearson, Harlow.

Saunders, M., Lewis, P. and Thornhill, A., (2023) *Research Methods for Business Students*. 9 edn, Pearson, Harlow.

Saurbier, A.L., (2020) 'A question of value: exploring perceptions of higher education value in academic and popular literature', *Economics and Culture*, 17(1), pp.62-74.

Say, J.B., (1851) *A treatise on political economy*. Lippincott, Grambo & Company.

Schermelleh-Engel, K., Moosbrugger, H. and Muller, H., (2003) 'Evaluating the Fit of Structural Equation Models: Tests of Significance and Descriptive Goodness-of-Fit Measures', *Methods of Psychological Research Online,* 8(2), pp.23-74.

Schreiber, J.B., Nora, A., Stage, F.K., Barlow, E.A. and King, J., (2006) 'Reporting Structural Equation Modeling and Confirmatory Factor Analysis Results: A Review', *The Journal of Educational Research,* 99(6), pp.323-337.

Scotland, J., (2012) 'Exploring the Philosophical Underpinnings of Research: Relating Ontology and Epistemology to the Methodology and Methods of the Scientific, Interpretive, and Critical Research Paradigms', *English Language Teaching*, 5(9), pp.9-16.

Scott, S.G. and Bruce, R.A., (1994) 'Determinants of innovative behavior: A path model of individual innovation in the workplace', *Academy of management journal*, 37(3), pp.580-607.

Segars, A.H., (1997) 'Assessing the unidimensionality of measurement: A paradigm and illustration within the context of information systems research', *Omega*, 25(1), pp.107-121.

Sekaran, U. and Bougie, R., (2016) *Research methods for business: A skill building approach*. john wiley & sons.

Selznick, B.S., Mayhew, M.J., Winkler, C.E. and McChesney, E.T., (2022) 'Developing Innovators: A Longitudinal Analysis Over Four College Years', In *Frontiers in Education* (Vol. 7, p. 854436). Frontiers.

Sharma, G., (2017) 'Pros and cons of different sampling techniques', *International journal of applied research*, 3(7), pp.749-752.

Sharma, M.R. and Nandi, S., (2022) 'Study of Marketing Strategy Within Private Higher Education Institutions', *Journal of Positive School Psychology*, 6(7), pp.5139-5147.

Sheatsley, P.B., (1983) 'Questionnaire construction and item writing', *Handbook of survey research*, 4(1), pp.195-230.

Sheldon, K.M. and Niemiec, C.P., (2006) 'It's not just the amount that counts: balanced need satisfaction also affects well-being', *Journal of personality and social psychology*, 91(2), p.331.

Shim, M.O., (2008) 'Competency Theory and Practice for Developing a Extension Competency Model', *Journal of Agricultural Extension & Community Development*, 15(1), pp.75-111.

Shiu, E. ed., (2017) *Research handbook of innovation and creativity for marketing management*. Edward Elgar Publishing.

Siaw, C.A. and Sarpong, D., (2021) 'Dynamic exchange capabilities for value co-creation in ecosystems', *Journal of Business Research*, 134, pp.493-506.

Siregar, M., Rohana, R., Ritonga, M., Toni, T. and Anjar, A., (2020) 'Effect of Innovative Behavior, Interpersonal Communication, Principal Managerial Competence on School Organization Development', *International Journal or Research and Review*, 7(1), pp.348-359.

Smaliukiene, R., Chi-Shiun, L. and Sizovaite, I., (2015) 'Consumer value co-creation in online business: the case of global travel services', *Journal of Business Economics and Management*, 16(2), pp.325-339.

Smith, A., (2013) 'The value co-destruction process: a customer resource perspective', *European Journal of Marketing*, 47(11/12), pp.1889-1909.

Smith, B., Williams, O., Bone, L. and Collective, T.M.S.W.C.P., (2023) 'Co-production: A resource to guide co-producing research in the sport, exercise, and health sciences', *Qualitative Research in Sport, Exercise and Health*, 15(2), pp.159-187.

Smith, J.A. and Osborn, M., (2003) 'Interpretative phenomenological analysis', In J. A. Smith (Ed.), *Qualitative Psychology: A Practical Guide to Methods*. London: Sage.

Smith, J.K., (1983) 'Quantitative versus qualitative research: An attempt to clarify the issue', *Educational Researcher*, 12(3), pp.6–13.

Solnet, D., Baum, T., Robinson, R.N. and Lockstone-Binney, L., (2016) 'What about the workers? Roles and skills for employees in hotels of the future', *Journal of Vacation Marketing*, 22(3), pp.212-226.

Sørensen, F. and Jensen, J.F., (2015) 'Value creation and knowledge development in tourism experience encounters', *Tourism Management*, 46, pp.336-346.

Spännäri, J., Juntunen, E., Pessi, A.B. and Ståhle, P., (2023) 'Compassion—A key to innovation: What promotes and what prevents innovation in organizations?', *Frontiers in Psychology*, 14, p.1058544.

Spohrer, J., (2021) 'Service innovation roadmaps and responsible entities learning', In *ITM Web of Conferences*, 38, p. 01001. EDP Sciences.

Spry, L., Foster, C., Pich, C. and Peart, S., (2020) 'Managing higher education brands with an emerging brand architecture: the role of shared values and competing brand identities.' *Journal of Strategic Marketing*, 28(4), pp.336-349.

Stampacchia, P., Colurcio, M., Edvardsson, B. and Coppola, M., (2015) 'VALUE IN USE AND IN (SOCIAL) CONTEXT Analysing how social actors co-create value', In *Service Dominant Logic, Network and Systems Theory and Service Science: Integrating three Perspectives for a New Service Agenda*.

Steen, T. and Brandsen, T., (2020) 'Coproduction during and after the COVID-19 pandemic: will it last?' *Public Administration Review*, 80(5), pp.851-855.

Steiger, J.H., (1990) 'Structural model evaluation and modification: an interval estimation approach', *Multivariate Behavioural Research,* 25(2), pp.173-180.

Steiner, A., Farmer, J., Yates, S., Moran, M. and Carlisle, K., (2022) 'How to systematically analyze co-production to inform future policies? Introducing 5Ws of co-production', *Public Administration Review*.

Stevenson, M., Hedberg, J., Highfield, K. and Diao, M., (2015) 'Visualizing solutions: Apps as cognitive stepping-stones in the learning process', *Electronic Journal of E-Learning*, 13(5), pp.366-379.

Strauss, A. and Corbin, J., (1998) *Basics of qualitative research: Techniques and procedures for developing grounded theory.* Thousand Oaks, CA: Sage.

Strobl, A., Matzler, K., Nketia, B.A. and Veider, V., (2020) 'Individual innovation behavior and firm-level exploration and exploitation: how family firms make the most of their managers', *Review of Managerial Science*, 14(4), pp.809-844.

Sturing, L., Biemans, H.J., Mulder, M. and De Bruijn, E., (2011) 'The nature of study programmes in vocational education: Evaluation of the model for comprehensive competence-based vocational education in the Netherlands', *Vocations and Learning*, 4, pp.191-210.

Suddaby, R., (2006) 'What grounded theory is not', *Academy of Management Journal*, 49(4), pp.633–43.

Sudman, S., (1983) 'The network polls: A critical review', *Public Opinion Quarterly*, 47(4), pp.490-496.

Sullivan, C. J., and Latessa, E., (2011) 'The coproduction of outcomes: An integrated assessment of youth and program effects on recidivism', *Youth violence and juvenile justice*, 9(3), pp.191- 206.

Sundaram, A., (2016) 'A painstaking exploration on the influence of perceived benefits towards training on training and development in Indian IT/ITES industry', *The Journal of Internet Banking and Commerce*, 21(2).

Sundbo, J. and Sørensen, F., (2013) 'Introduction to the experience economy', In *Handbook on the experience economy* (pp. 1-18). Edward Elgar Publishing.

Swanger, D., (2016) *Innovation in higher education: Can colleges really change*. Edinburg: PBS Newshour.

Taatila, V. and Down, S., (2012) 'Measuring entrepreneurial orientation of university students', *Education+ training*, 54(8/9), pp.744-760.

Tabuenca, B., Serrano-Iglesias, S., Martin, A.C., Villa-Torrano, C., Dimitriadis, Y., Asensio-Pérez, J.I., Alario-Hoyos, C., Gomez-Sanchez, E., Bote-Lorenzo, M.L., Martinez-Mones, A. and Kloos, C.D., (2021) 'Affordances and core functions of smart learning environments: A systematic literature review', *IEEE Transactions on Learning Technologies*, 14(2), pp.129-145.

Tadajewski, M. and Jones, D.B., (2021) 'From goods-dominant logic to service-dominant logic? Service, service capitalism and service socialism', *Marketing Theory*, 21(1), pp.113-134.

Taherdoost, H., (2022) 'What are different research approaches? Comprehensive review of qualitative, quantitative, and mixed method research, their applications, types, and limitations', *Journal of Management Science & Engineering Research*, 5(1), pp.53-63.

Takahashi, S. and Takahashi, V.P., (2021) 'Integrated co-creation process with multiple stakeholders in innovation networks', *Innovation & Management Review*, 19(4), pp.382-399.

Tantalo, C. and Priem, R.L., (2016) 'Value creation through stakeholder synergy', *Strategic Management Journal*, 37(2), pp.314-329.

Taylor, C.A. and Bovill, C., (2018) 'Towards an ecology of participation: Process philosophy and co-creation of higher education curricula', *European Educational Research Journal*, 17(1), pp.112-128.

Taylor, S.A. and Judson, K.M., (2011) 'A service perspective on the marketization of undergraduate education', *Service Science*, 3(2), pp.110-126.

Taylor, S.J. and Bogdan, R., (1998) *Introduction to qualitative research methods: A guidebook and resource* (3rd ed.). New York: John Wiley.

Tanev, S., Bailetti, T., Allen, S., Milyakov, H., Durchev, P. and Ruskov, P., (2011) 'How do value co-creation activities relate to the perception of firms' innovativeness?', *Journal of Innovation Economics*, 1, pp.131-159.

Tang, M., (2017) 'Creativity and innovation: basic concepts and approaches', *Handbook of the management of creativity and innovation: Theory and practice*, pp.3-32.

Taxt, R.E., Robinson, D.K., Schoen, A. and Fløysand, A., (2022) 'The embedding of universities in innovation ecosystems: The case of marine research at the University of Bergen', *Norsk Geografisk Tidsskrift-Norwegian Journal of Geography*, 76(1), pp.42-60.

Teece, D.J., Pisano, G. and Shuen, A., (1997) 'Dynamic capabilities and strategic management', *Strategic Management Journal*, 18(7), pp.509-533.

Terry, G., Hayfield, N., Clarke, V. and Braun, V., (2017) 'Thematic analysis', *The SAGE handbook of qualitative research in psychology*, 2, pp.17-37.

Thompson, M., (2018) 'Social capital, innovation and economic growth', *Journal of Behavioral and Experimental Economics*, 73, pp.46-52.

Ticehurst, G.W. and Veal, A.J., (2000) *Business Research Methods*. French Forest, Australia: Longman.

Tidd, J., and Bessant, J., (2009) *Managing innovation (4th ed.)*. Chichester: Wiley.

Tinto, V., (2005) 'Reflections on retention and persistence: Institutional actions on behalf of student persistence', *Studies in Learning, Evaluation, Innovation and Development*, 2, pp.89-97.

Tolstykh, T., Gamidullaeva, L. and Shmeleva, N., (2020) 'Elaboration of a mechanism for sustainable enterprise development in innovation ecosystems', *Journal of Open Innovation: Technology, Market, and Complexity*, 6(4), p.95.

Torres, B.E.M., Ramírez, M.A.N., Torres, R.M. and Vargas, R.A., (2019) 'Innovative Ability Mission of the Enterprising University', *Journal of Humanities, Arts and Social Sciences*, 3(2), pp.32-42.

Trivedi, J.P. and Trivedi, H., (2018) 'Investigating the factors that make a fashion app successful: The moderating role of personalization', *Journal of Internet Commerce*, 17(2), pp.170-187.

Turhan, N.S., (2019) 'Qualitative Research Designs: Which one is the best for your research?', *European Journal of Special Education Research*, 4(2), pp.124-136.

Turner, J.A., Klerkx, L., Rijswijk, K., Williams, T. and Barnard, T., (2016) 'Systemic problems affecting co-innovation in the New Zealand Agricultural Innovation System: Identification of blocking mechanisms and underlying institutional logics', *NJAS-Wageningen Journal of Life Sciences*, 76, pp.99-112.

Twycross, A. and Shields, L., (2004) 'Validity and Reliability-What's it All About? Part 2: Reliability in Quantitative Studies', *Paediatric Nursing*, 16(10), p.36.

Ullman, J.B., (2001) 'Structural equation modelling', In: B.G. Tabachnick and L.S. Fedell, eds. *Using Multivariate Statistics.* Boston: Allyn and Bacon.

Ullman, J.B., (2006) 'Structural Equation Modeling: Reviewing the Basics and Moving Forward', *Journal of Personality Assessment,* 87(1), p.35–50.

Ullman, J.B. and Bentler, P.M., (2012) 'Structural equation modeling', *Handbook of Psychology, Second Edition*, *2*.

UNCTAD (2023) 'UN warns of soaring global public debt: a record $92 trillion in 2022'. Available at: https://unctad.org/news/un-warns-soaring-global-public-debt-record-92-trillion-2022 (Accessed: 19th September 2023).

Valaei, N., Rezaei, S. and Emami, M., (2017) 'Explorative learning strategy and its impact on creativity and innovation: An empirical investigation among ICT-SMEs', *Business Process Management Journal*, 23(5), pp.957-983.

Valtakari, M., Nyman, J., Hjelt, M., Sepponen, S., Järvelin, A.M., Halme, K. and Haila, K., (2018) 'Evaluation of Pre-Commercialization Activities of Tekes: TUTL and Innovation Scout', *Evaluation Report*, *2*. Available at: https://www.businessfinland.fi/globalassets/julkaisut/evaluation_of_precommercialisation_activities_of_tekes_tutl_and_innovation_scout.pdf (Accessed: 11 July 2022).

van der Hel, S., (2016) 'New science for global sustainability? The institutionalisation of knowledge co-production in Future Earth', *Environmental Science & Policy*, 61, pp.165-175.

van Vught, F. and Westerheijden, D.F., (2010) 'Multidimensional ranking: a new transparency tool for higher education and research', *Higher Education Management and Policy*, 22(3), pp.1-26.

Vanleene, D., Verschuere, B. and Voets, J., (2015) 'Benefits and Risks of coproduction: a preliminary literature review', In *IIAS Workshop on Coproduction*.

Vargo, S.L., (2007) 'On a theory of markets and marketing: from positively normative to normatively positive', *Australasian Marketing Journal*, 15(1), pp.53-60.

Vargo, S.L. and Akaka, M.A., (2009) 'Service-dominant logic as a foundation for service science: clarifications', *Service Science*, 1(1), pp.32-41.

Vargo, S.L. and Lusch, R.F., (2004) 'Evolving to a new dominant logic for marketing', *Journal of Marketing*, 68(1), pp.1-17.

Vargo, S.L., and Lusch, R.F. (2008) 'Service-dominant logic: continuing the evolution', *Journal of the Academy Marketing Science*, 36(1), pp. 1-10.

Vargo, S.L. and Lusch, R.F., (2014) 'Inversions of service-dominant logic', *Marketing Theory*, 14(3), pp.239-248.

Vargo, S.L., and Lusch, R.F. (2016) 'Institutions and axioms: an extension and update of service-dominant logic', *Journal of the Academy of Marketing Science*, 44(5), pp. 5-23.

Vargo, S.L., and Lusch, R.F. (2017) 'Service-dominant logic 2025', *International Journal of Research in Marketing*, 34(1), pp. 46-67.

Vargo S.L., Lusch R.F., and Akaka M.A. (2010) 'Advancing Service Science with Service-Dominant Logic', *Handbook of Service Science. Service Science: Research and Innovations in the Service Economy*. Boston: Springer, pp. 133-156.

Vargo, S.L., Maglio, P.P. and Akaka, M.A., (2008) 'On value and value co-creation: A service systems and service logic perspective', *European Management Journal*, 26(3), pp.145-152.

Velasco, M., (2014) 'Do higher education institutions make a difference in competence development? A model of competence production at university', *Higher Education*, 68, pp.503-523.

Vergara, S.C. and Caldas, M.P., (2005) 'Paradigma interpretacionista: a busca da superação do objetivismo funcionalista nos anos 1980 e 1990', *Revista de Administração de Empresas*, 45, pp.66-72.

Verschuere, B., Brandsen, T. and Pestoff, V., (2012) 'Co-production: The state of the art in research and the future agenda', *VOLUNTAS: International Journal of Voluntary and Nonprofit Organizations*, 23, pp.1083-1101.

Vidal, N.G., Berman, S. and Buren, H.V., (2015) 'Stakeholder theory and value creation models in Brazilian firms', *Revista Brasileira de Gestão de Negócios*, 17, pp.911-931.

Viki, T., (2018) *Why large companies continue to struggle with innovation*. Available at: https://www.forbes.com/sites/tendayiviki/2018/11/04/why-large-companies-continue-to-struggle-with-innovation/#230f80fc67b4 (Accessed: 15 May 2020).

Vincent, K., Daly, M., Scannell, C. and Leathes, B., (2018) 'What can climate services learn from theory and practice of co-production?', *Climate Services*, 12, pp.48-58.

Virtanen, A. and Tynjälä, P., (2018) 'Factors explaining the learning of generic skills: a study of university students' experiences', *Teaching in Higher Education*, 24(7), pp.880-894.

Visvizi, A., Troisi, O. and Grimaldi, M., (2023) 'Exploring the drivers for digital transformation in smart education: An ecosystems approach', In *ITM Web of Conferences* (Vol. 51). EDP Sciences.

Voorberg, W.H., Bekkers, V.J. and Tummers, L.G., (2015) 'A systematic review of co-creation and co-production: Embarking on the social innovation journey', *Public Management Review*, 17(9), pp.1333-1357.

Voll, C.N., (2023) *D 6.1 Report on indicators for co-creation teaching.* EuroTeQ Engineering University.

Volles, N., Switzer, C., Volles, N., Switzer, C. and Academia, I., (2020) Nexus in the Mediterranean, Union for the Mediterranean, Spain. Available at: https://www.researchgate.net/profile/Nina-Volles/publication/346577275_Reinforcing_the_Innovation-Employability_Nexus_in_the_Mediterranean_-_A_Handbook_for_Academia_Industry_and_Policy_Makers/links/5fc82920a6fdcc697bd798ae/Reinforcing-the-Innovation-Employability-Nexus-in-the-Mediterranean-A-Handbook-for-Academia-Industry-and-Policy-Makers.pdf (Accessed: 30 August 2022).

Waheed, A., Waheed, S., Ahmad, N. and Karamat, J., (2023) 'Work engagement and organisation performance: the mediating role of innovative work behaviour and moderating role of perceived distributive fairness in manufacturing industry of Pakistan', *International Journal of Business Performance Management*, 24(1), pp.47-72.

Wang, J., Chen, C.I., Liu, Y., Barkley, D. and Wu, C.C., (2020) 'Intercultural competences and job satisfaction of expatriates: the mediating effect of positive psychological well-being', *International Journal of Organizational Innovation (Online)*, 12(3), pp.140-155.

Wang, K. and Nickerson, J.V., (2017) 'A literature review on individual creativity support systems', *Computers in Human Behavior*, 74, pp.139-151.

Waseem, D., Biggemann, S. and Garry, T., (2018) 'Value co-creation: The role of actor competence', *Industrial Marketing Management*, 70, pp.5-12.

Watts, F., García-Carbonell, A. and Andreu-Andrés, M.A., (2013) 'Innovation competencies development: INCODE Barometer and user guide', *Turku: Turku University od Applied Sciences*. Available at: https://www.researchgate.net/publication/323945648_Innovation_Competencies_Development_-_INCODE_BAROMETER_AND_USER_GUIDE/link/5ab3ef88458515ecebf0f3fc/download (Accessed: 30 August 2022).

Watts-Hooge, F., Marin-Garcia, J.A., Carbonell, A.G. and Mas, L.E.A., (2014) 'Validation of a rubric to assess innovation competence', *Working Papers on Operations Management*, 3(1), pp.61-70.

Waychal, P., Mohanty, R.P. and Verma, A., (2011) 'Determinants of innovation as a competence: An empirical study', *International Journal of Business Innovation and Research*, 5(2), pp.192-211.

Weston, R. and Gore Jr, P.A., (2006) 'A brief guide to structural equation modeling', *The Counseling Psychologist*, 34(5), pp.719-751.

White, R.W., (1959) 'Motivation reconsidered: the concept of competence', *Psychological review*, 66(5), p.297-333.

Wikström, S., (1996) 'The customer as co-producer', *European Journal of Marketing*, 30(4), pp.6-19.

Williams, C., (2007) 'Research methods', *Journal of Business & Economics Research (JBER)*, 5(3).

Willig, C. (2003) 'Discourse analysis', In J. A. Smith (Ed.), *Qualitative psychology: A practical guide to research methods* (pp.159-183). London: Sage.

Wilton, C., (2021) 'Coproduction and partnership with people and communities', *BMJ Leader*, 5(2), pp.79-82.

Witell, L., Kristensson, P., Gustafsson, A. and Löfgren, M., (2011) 'Idea generation: customer co-creation versus traditional market research techniques', *Journal of Service Management*, 22(2), pp.140-159.

Woodall, T., (2003) 'Conceptualising 'value for the customer': an attributional, structural and dispositional analysis', *Academy of marketing science review*, 12(1), pp.1-42.

Woodruff, R.B., (1997) 'Customer value: the next source for competitive advantage', *Journal of the academy of marketing science*, 25, pp.139-153.

Woods, K. and Homer, D., (2022) 'The staff–student co-design of an online resource for pre-arrival arts and humanities students', *Arts and Humanities in Higher Education*, 21(2), pp.176-197.

Woolcock, M., (1998) 'Social capital and economic development: Toward a theoretical synthesis and policy framework', *Theory and society*, 27(2), pp.151-208.

Woolcock, M., (2010) 'The rise and routinization of social capital, 1988–2008', *Annual review of political science*, 13, pp.469-487.

World Economic Forum, (2015) *New vision for education: Unlocking the potential of technology*. Vancouver, BC: British Columbia Teachers' Federation. Available at: https://www3.weforum.org/docs/WEFUSA_NewVisionforEducation_Report2015.pdf (Accessed: 30 August 2022).

World Economic Forum, (2020) *These are the top 10 job skills of tomorrow – and how long it takes to learn them*. Available at: https://www.weforum.org/agenda/2020/10/top-10-work-skills-of-tomorrow-how-long-it-takes-to-learn-them/ (Accessed: 22nd September 2023).

World Economic Forum, (2020) *The future of jobs report 2020*. Retrieved from Geneva.

World Intellectual Property Organization (WIPO), (2023) *Global Innovation Index 2023: Innovation in the face of uncertainty*. Geneva: WIPO. Available at: https://www.wipo.int/edocs/pubdocs/en/wipo-pub-2000-2023-en-main-report-global-innovation-index-2023-16th-edition.pdf (Accessed: 15th October 2023).

Wright, C., Ritter, L.J. and Wisse Gonzales, C., (2022) 'Cultivating a collaborative culture for ensuring Sustainable Development Goals in higher education: An integrative case study', *Sustainability*, 14(3), p.1273.

Wu, X., Liang, L. and Chen, S., (2022) 'How big data alters value creation: Through the lens of big data competency', *Management Decision*, 60(3), pp.707-734.

Wulandari, J., Raharja, S.U., Nurasa, H. and Muhyi, H., (2017) 'Individual Competency Study in the Evolution of Human Resource Management Theory and Its Relation to Organizational Competency', *International Journal of Management and Administrative Sciences*, 5(3), pp.35-43.

Yanow, D. and Schwartz-Shea, P., (2009) 'Interpretive research: Characteristics and criteria', *Revue Internationale de Psychosociologie*, (35), pp.29-38.

Yang, J.H., Fang, S.C. and Huang, C.Y., (2017) 'The mediating role of competency on the relationship between training and task performance: Applied study in pharmacists', *International Journal of Business Administration*, 8(7), pp.16-24.

Yeboah, D., (2023) 'Understanding perceived value as important factors for the successful implementation of value co-creation at the dyadic level', *International Hospitality Review*.

Yeo, R., (2009) 'Service Quality Ideals in a Competitive Tertiary Environment', *International Journal of Educational Research*, 48(1), pp.62-76.

Yepes, V. and López, S., (2023) 'The Knowledge Sharing Capability in Innovative Behavior: A SEM Approach from Graduate Students' Insights', *International Journal of Environmental Research and Public Health*, 20(2), p.1284.

Yesil, S. and Sozbilir, F., (2013) 'An empirical investigation into the impact of personality on individual innovation behaviour in the workplace', *Procedia-Social and Behavioral Sciences*, 81, pp.540-551.

Yi, Y. and Gong, T., (2013) 'Customer value co-creation behavior: Scale development and validation', *Journal of Business research*, 66(9), pp.1279-1284.

Yu, J., Wen, Y., Jin, J. and Zhang, Y., (2019) 'Towards a service-dominant platform for public value co-creation in a smart city: Evidence from two metropolitan cities in China', *Technological Forecasting and Social Change*, 142, pp.168-182.

Yuan, F. and Woodman, R.W., (2010) 'Innovative behavior in the workplace: The role of performance and image outcome expectations', *Academy of Management Journal*, 53(2), pp.323-342.

Zaiţ, A. and Bertea, P.S.P.E., (2011) 'Methods for testing discriminant validity', *Management & Marketing Journal*, 9(2), pp.217-224.

Zalaghi, H. and Khazaei, M., (2016) 'The role of deductive and inductive reasoning in accounting research and standard setting', *Asian Journal of Finance & Accounting*, 8(1), pp.23-37.

Zarandi, N., Soares, A. and Alves, H., (2022) 'Strategies, benefits and barriers–a systematic literature review of student co-creation in higher education', *Journal of Marketing for Higher Education*, pp.1-25.

Zeithaml, V.A., Verleye, K., Hatak, I., Koller, M. and Zauner, A., (2020) 'Three decades of customer value research: paradigmatic roots and future research avenues', *Journal of Service Research*, 23(4), pp.409-432.

Zhaoxia, W., (2019) 'Research on the Value Co-creation of Official Brand Accounts in Short Video Platform', Jinan University.

Zhang, K. and Hyvärinen, A., (2016) 'Nonlinear functional causal models for distinguishing cause from effect', *Statistics and causality: Methods for applied empirical research*, pp.185-201.

Zhang, W., Ding, L., Yin, J. and Song, W., (2023) 'The Relationships between Emotion, Sense of Coherence, Social Rhythm and Positive Mental Health in Chinese University Students during COVID-19', *Psychology*, 14(2), pp.295-304.

Zhang, Z., (2023) 'Validation of Self-Determination Scale: An Experiential Consumption Perspective', *Journal of Business and Management*, 28(2), pp.89-119.

Zhu, Y., Wei, Y., Zhou, Z. and Jiang, H., (2022) 'Consumers' continuous use intention of O2O E-commerce platform on community: a value Co-creation perspective', *Sustainability*, 14(3), p.1666.

Zhuang, L., Williamson, D. and Carter, M., (1999) 'Innovate or liquidate: Are all organisations convinced? A two-phased study into the innovation process', *Management Decisions*, 37(1), pp.57–71.

Zikmund, W.G., (2003) *Business Research Methods* (7th edn.). Ohio: Thomson/South-Western.

Zikmund, W.G., Babin, B.J., Carr, J.C. and Griffin, M., (2013) *Business Research Methods*. Cengage learning.

Zineshteyn, M., (2023) *Report: CSU system faces $1.5 Billion deficit, should consider tuition hike*. Available at: https://timesofsandiego.com/education/2023/05/27/report-csu-system-faces-1-5-billion-deficit-should-consider-tuition-hike/ (Accessed: 1 June 2023).

Zohrabi, M., (2013) 'Mixed Method Research: Instruments, Validity, Reliability and Reporting Findings', *Theory and Practice in Language Studies*, 3(2), pp.254-262.

Zsigmond, T., Zsigmondová, A. and Machová, R., (2021) 'From Goods-dominant logic to Service-dominant logic', In *SHS Web of Conferences* (Vol. 120, p. 02015). EDP Sciences.

Appendix I – Research Ethics Approval

Brunel University London

College of Business, Arts and Social Sciences Research Ethics Committee
Brunel University London
Kingston Lane
Uxbridge
UB8 3PH
United Kingdom

www.brunel.ac.uk

24 August 2022

LETTER OF APPROVAL

APPROVAL HAS BEEN GRANTED FOR THIS STUDY TO BE CARRIED OUT BETWEEN 24/08/2022 AND 01/11/2022

Applicant (s): Mr Ammar Al Hawaj

Project Title: Innovation and student benefits as co-created values in a classroom setting in a higher education institution: A case study

Reference: 38132-LR-Aug/2022- 41358-2

Dear Mr Ammar Al Hawaj

The Research Ethics Committee has considered the above application recently submitted by you.

The Chair, acting under delegated authority has agreed that there is no objection on ethical grounds to the proposed study. Approval is given on the understanding that the conditions of approval set out below are followed:

- **Invitation: You adapt your invitation so that it is relevant to those you are inviting to take part in the Interview.**
- **Data Storage: You store your data on the Brunel network server.**
- **Participant Information Sheet: Who is organising and funding the research? Please state that the research is being organised by yourself [state full name] in conjunction with Brunel University London.Who is organising and funding the research? Please state that the research is being organised by yourself [state full name] in conjunction with Brunel University London.**
- **The agreed protocol must be followed. Any changes to the protocol will require prior approval from the Committee by way of an application for an amendment.**
- **Please ensure that you monitor and adhere to all up-to-date local and national Government health advice for the duration of your project.**

Please note that:

- Research Participant Information Sheets and (where relevant) flyers, posters, and consent forms should include a clear statement that research ethics approval has been obtained from the relevant Research Ethics Committee.
- The Research Participant Information Sheets should include a clear statement that queries should be directed, in the first instance, to the Supervisor (where relevant), or the researcher. Complaints, on the other hand, should be directed, in the first instance, to the Chair of the relevant Research Ethics Committee.
- Approval to proceed with the study is granted subject to receipt by the Committee of satisfactory responses to any conditions that may appear above, in addition to any subsequent changes to the protocol.
- The Research Ethics Committee reserves the right to sample and review documentation, including raw data, relevant to the study.
- If your project has been approved to run for a duration longer than 12 months, you will be required to submit an annual progress report to the Research Ethics Committee. You will be contacted about submission of this report before it becomes due.
- You may not undertake any research activity if you are not a registered student of Brunel University or if you cease to become registered, including abeyance or temporary withdrawal. As a deregistered student you would not be insured to undertake research activity. Research activity includes the recruitment of participants, undertaking consent procedures and collection of data. Breach of this requirement constitutes research misconduct and is a disciplinary offence.

Professor David Gallear

Chair of the College of Business, Arts and Social Sciences Research Ethics Committee

Page 1 of 2

316

Appendix II - Participant Information Sheet

PARTICIPANT INFORMATION SHEET

Study title

Innovation and student benefits as co-created values in a classroom setting in a higher education institution: A case study

Invitation Paragraph
You are being invited to take part in a research study. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following

Thank you for reading this.

What is the purpose of the study?
The purpose of the research is to investigate the factors affecting value co-creation in a higher education institution. More specifically, an exploration of the factors affecting student benefits, including innovation, to gain knowledge on how these values occur within a dyadic relationship in a classroom setting.

Why have I been invited to participate?
This research is designed to obtain information, opinions, and insights from undergraduate students, faculty, alumni, and management at a university. You have been invited to take part in this research because you belong to one or more of these categories. You must be over 18 years of age to participate in this survey/interview.

Do I have to take part?
As participation is entirely voluntary, it is up to you to decide whether or not to take part. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a consent form. If you decide to take part, you are still free to withdraw at any time and without giving a reason. You can choose to withdraw yourself from taking part in this research on or before 1ˢᵗ November 2022.

What will happen to me if I take part?
You will be invited to participate in an online survey or an online one-to-one interview. You will be asked a range of questions depending upon your profile and category as a stakeholder.

Are there any lifestyle restrictions?
There are no lifestyle restrictions applicable.

What are the possible disadvantages and risks of taking part?
There are no risks or disadvantages in taking part.

What are the possible benefits of taking part?
There are no direct benefits. However, the research findings may provide useful insights for understanding how value co-creation occurs, and the role of the actors involved.

What if something goes wrong?
You are always able to stop the interview at any moment. There is nothing right or wrong about your answer. For complaints, you may contact the chair of the research ethics committee whose name, and contact detail, are provided at the end of this sheet.

Will my taking part in this study be kept confidential?
All information which is collected about you during the course of the research will be kept strictly confidential. Any information published will not have any identifying details (e.g., your name, designation, etc.) so that you cannot be identified by it. Please also be advised that the data will be stored on a password protected locked file or on the password protected Brunel network server, and raw data will be deleted when no longer needed. I undertake to conduct myself and my research in a manner that reflects the professional ethics of Brunel University London.

Will I be recorded, and how will the recording be used?
Interviewees participating in the online semi-structured interviews will be audio recorded for transcription purposes only for use in this research. The recordings will be deleted when no longer needed – after graduation.

What will happen to the results of the research study?
The objective is to have the results of the study published in a PhD thesis of Brunel University London.

Who is organising and funding the research?
The research is self-funded, and organised by myself (Ammar Al Hawaj) in conjunction with Brunel University London.

What are the indemnity arrangements?
Not applicable due to the online nature of the study. However, Brunel University London does provide appropriate insurance cover for research which has received ethical approval.

Who has reviewed the study?

The study has been reviewed by the University Research Ethics Committee at Brunel University London.

This research has obtained ethics approval from the relevant Research Ethics Committee at Brunel University London.

Research Integrity

Brunel University London is committed to compliance with the Universities UK Research Integrity Concordat.

You are entitled to expect the highest level of integrity from the researchers during the course of this research

Contact for further information and complaints

Researcher name and details: Mr. Ammar Al-Hawaj (ammar.al-hawaj@brunel.ac.uk)

Supervisor name and details: Dr. Bidit Dey (bidit.dey@brunel.ac.uk)

For complaints, Chair of the Research Ethics Committee: Prof. David Gallear (david.gallear@brunel.ac.uk)

Appendix III - Invitation to Participate in Survey (Questionnaire)

Invitation to Participate in Survey

Brunel University London

Dear Student,

I am currently registered for the degree of Doctor of Philosophy, which I am completing by thesis in Brunel Business School.

I would like to invite you to take part in this research. My study constitutes an investigation of innovation and student benefits as co-created values in a classroom setting in a higher education institution within the context of academic research. Participation would comprise participation in a 15-minute online questionnaire.

This survey is both confidential and anonymous. Your participation is completely voluntary and involves no risk, penalty, or loss of benefits whether you participate or choose not to. You may withdraw from the survey within 2 months from the date of submission.

The study is for academic publication purposes only. The results of the study will be reported in my thesis, which will be published by Brunel University London. Confidentiality is ensured at all times, and details that might specifically identify an individual are not required at any stage. Completed questionnaires will be stored on Brunel's password protected server for further analysis and will thereafter be destroyed after graduation. I undertake to conduct myself and my research in a manner that reflects the professional ethics of the university.

This research has obtained ethics approval from the relevant Research Ethics Committee at Brunel University London.

Any queries regarding the questionnaire or any other aspect of the study can be directed to myself or to my supervisor, Dr. Bidit Dey, on the email addresses listed below.

Yours sincerely,

Ammar Al-Hawaj
ammar.al-hawaj@brunel.ac.uk

Supervisor
Dr. Bidit Dey
bidit.dey@brunel.ac.uk

Appendix IV - Invitation to Participate in Survey (Interview)

Invitation to Participate in Study

Brunel University London

Brunel
University
London

Dear Madam,

I am currently registered for the degree of Doctor of Philosophy, which I am completing by thesis in Brunel Business School.

I would like to invite you to take part in this research. My study constitutes an investigation of innovation and student benefits as co-created values in a classroom setting in a higher education institution within the context of academic research. Participation would comprise of an interview of relevant stakeholders; in this case, employers of Ahlia University bachelor degree graduates.

This survey is both confidential and anonymous. Your participation is completely voluntary and involves no risk, penalty, or loss of benefits whether you participate or choose not to. You may withdraw from the survey within 2 months from the date of submission.

The study is for academic publication purposes only. The results of the study will be reported in my thesis, which will be published by Brunel University London. Confidentiality is ensured at all times, and details that might specifically identify an individual are not required at any stage. Interview recordings and related data will be stored on Brunel's password protected server for further analysis and will thereafter be destroyed after graduation. I undertake to conduct myself and my research in a manner that reflects the professional ethics of the university.

You are kindly asked to review the participant information sheet and provide your consent on the attached consent form if you agree to participate in this research.

This research has obtained ethics approval from the relevant Research Ethics Committee at Brunel University London.

Any queries regarding the questionnaire or any other aspect of the study can be directed to myself or to my supervisor, Dr. Bidit Dey, on the email addresses listed below.

Yours sincerely,

Ammar Al-Hawaj

Appendix V - Screen shot of Web-based Survey (Survey Monkey)

Copy of Innovation and student benefits as co-created values in a classroom setting in a higher education institution: A case study
Invitation to Participate in Survey
Brunel University London

Dear Participant,

I am currently registered for the degree of Doctor of Philosophy, which I am completing by thesis in Brunel Business School.

I would like to invite you to take part in this research. My study constitutes an investigation of innovation and student benefits as co-created values in a classroom setting in a higher education institution within the context of academic research. Participation would comprise participation in a 15-minute online questionnaire.

This survey is both confidential and anonymous. Your participation is completely voluntary and involves no risk, penalty, or loss of benefits whether you participate or choose not to. You may withdraw from the survey within 2 months from the date of submission.

The study is for academic publication purposes only. The results of the study will be reported in my thesis, which will be published by Brunel University London. Confidentiality is ensured at all times, and details that might specifically identify an individual are not required at any stage. Completed questionnaires will be stored on Brunel's password protected server for further analysis and will thereafter be destroyed after graduation. I undertake to conduct myself and my research in a manner that reflects the professional ethics of the university.

This research has obtained ethics approval from the relevant Research Ethics Committee at Brunel University London.

Any queries regarding the questionnaire or any other aspect of the study can be directed to myself or to my supervisor, Dr. Bidit Dey, on the email addresses listed below.

Yours sincerely,

Ammar Al-Hawaj
ammar.al-hawaj@brunel.ac.uk

Supervisor
Dr. Bidit Dey
bidit.dey@brunel.ac.uk

Copy of Innovation and student benefits as co-created values in a classroom setting in a higher education institution: A case study

PARTICIPANT INFORMATION SHEET

Study title

Innovation and student benefits as co-created values in a classroom setting in a higher education institution: A case study

Invitation Paragraph

You are being invited to take part in a research study. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following

Thank you for reading this.

What is the purpose of the study?

The purpose of the research is to investigate the factors affecting value co-creation in a higher education institution. More specifically, an exploration of the factors affecting student benefits, including innovation, to gain knowledge on how these values occur within a dyadic relationship in a classroom setting.

Why have I been invited to participate?

This research is designed to obtain information, opinions, and insights from undergraduate students, faculty, alumni, and management at a university. You have been invited to take part in this research because you belong to one or more of these categories. You must be over 18 years of age to participate in this survey/interview.

Do I have to take part?

As participation is entirely voluntary, it is up to you to decide whether or not to take part. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a consent form. If you decide to take part, you are still free to withdraw at any time and without giving a reason. You can choose to withdraw yourself from taking part in this research on or before 10th November 2022.

What will happen to me if I take part?

You will be invited to participate in an online survey or an online one-to-one interview. You will be asked a range of questions depending upon your profile and category as a stakeholder.

Are there any lifestyle restrictions?

There are no lifestyle restrictions applicable.

What are the possible disadvantages and risks of taking part?

There are no risks or disadvantages in taking part.

What are the possible benefits of taking part?

There are no direct benefits. However, the research findings may provide useful insights for understanding how value co-creation occurs, and the role of the actors involved.

What if something goes wrong?

You are always able to stop the interview at any moment. There is nothing right or wrong about your answer. For complaints, you may contact the chair of the research ethics committee whose name, and contact detail, are provided at the end of this sheet.

Will my taking part in this study be kept confidential?

All information which is collected about you during the course of the research will be kept strictly confidential. Any information published will not have any identifying details (e.g., your name, designation, etc.) so that you cannot be identified by it. Please also be advised that the data will be stored on a password protected locked file or on the password protected Brunel network server, and raw data will be deleted when no longer needed. I undertake to conduct myself and my research in a manner that reflects the professional ethics of Brunel University London.

Will I be recorded, and how will the recording be used?

Interviewees participating in the online semi-structured interviews will be audio recorded for transcription purposes only for use in this research. The recordings will be deleted when no longer needed – after graduation.

What will happen to the results of the research study?

The objective is to have the results of the study published in a PhD thesis of Brunel University

Who is organising and funding the research?

The research is self-funded, and organised by myself (Ammar Al Hawaj) in conjunction with Brunel University London.

What are the indemnity arrangements?

Not applicable due to the online nature of the study. However, Brunel University London does provide appropriate insurance cover for research which has received ethical approval.

Who has reviewed the study?

The study has been reviewed by the University Research Ethics Committee at Brunel University London.

This research has obtained ethics approval from the relevant Research Ethics Committee at Brunel University London.

Research Integrity

Brunel University London is committed to compliance with the Universities UK Research Integrity Concordat. You are entitled to expect the highest level of integrity from the researchers during the course of this research

Contact for further information and complaints

Researcher name and details: Mr. Ammar Al-Hawaj (ammar.al-hawaj@brunel.ac.uk)

Supervisor name and details: Dr. Bidit Dey (bidit.dey@brunel.ac.uk)

For complaints, Chair of the Research Ethics Committee: Prof. David Gallear (david.gallear@brunel.ac.uk)

Copy of Innovation and student benefits as co-created values in a classroom setting in a higher education institution: A case study

Online Consent Form Template

Please confirm the following:

I have read the Participant Information Sheet included with this questionnaire / interview invitation

○ Yes

○ No

I am over the age of 18

○ Yes

○ No

I understand that no personal identifying data is collected in this study, therefore I know that once I have submitted my answers I am unable to withdraw my data from the study

○ Yes

○ No

I agree that my data can be anonymised, stored and used in future research in line with Brunel University's data retention policies

○ Yes

○ No

I agree to take part in this study

○ Yes

○ No

Appendix VI – Survey Instrument (Questionnaire)

Section 1: Demographic variables

1. Gender:

Male	Female

2. Please choose your level of interest in participating in innovation in the classroom

Level 1	Level 2	Level 3
Fully interested	Partially interested	Not interested

3. Please choose the programme in which you are currently enrolled

#	Programme	Tick
1	Bachelor's Degree in Accounting & Finance (BSAF)	
2	Bachelor's Degree in Banking & Finance (BSBF)	
3	Bachelor's Degree in Computer and Communication Engineering (BSCCE)	
4	Bachelor's Degree in Economics & Finance (BSEF)	
5	Bachelor's Degree in Information Technology (BSIT)	
6	Bachelor's Degree in Management & Marketing (BSMM)	
7	Bachelor's Degree in Management Information Systems (BSMIS)	
8	Bachelor's Degree in Mass Communication & Public Relations (BSMCPR)	
9	Bachelor's Degree in Mobile and Network Engineering (BSMNE)	
10	Bachelor's Degree in Multimedia Systems (BSMS)	
11	Bachelor's Degree in Interior Design (BSID)	

Section 2:

Value co-creation

Co-creation of values consists of the coproduction of values generated by value propositions and the concept of value-in-use. Students' value co-creation is said to occur in an academic environment when the three constructs namely co-production, value-in-use, and student benefits are derived during the process of active participation in the classroom.

Please indicate your level of agreement with the statements given below by rating with an "X" against each item on the five-point Likert scale shown below.

1	2	3	4	5
Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree

Co-production in higher education is defined as the participation of students and faculty during the service process and their cooperation directly or indirectly, and suggests that it can consist of information access, dialogue, and control).

Constructs	Items					
Co-production		1	2	3	4	5
Knowledge sharing	The faculty was open to my ideas and suggestions for existing or new learning content.					
	The faculty provided enough explanation and information for me to learn.					
	I was willing to spend my time and effort to share my ideas and suggestions for learning with the faculty.					
	The faculty provided an appropriate environment and opportunity for me to offer my suggestions and ideas.					
Equity	I could easily access the learning content provided by the faculty was according to my interest level.					
	The learning content provided by the faculty was consistent with my learning needs.					
	I thought my role was important in the classroom learning process.					
	The faculty and I used the best communication channels to share learning results.					
Interaction	I was able to express my needs conveniently during the learning process in the classroom.					
	The faculty gave me enough information related to learning in the classroom.					
	Me and the faculty interacted sufficiently during the learning process in the classroom.					
	During the course of learning in the classroom, I played an active role in interacting with faculty members to get knowledge.					

Value-in-use (ViU): It indicates how to consume or use value propositions provided by consumers' time, place and experience and hence part of value co-created to use what is co-produced by consumers and organisations.

Please indicate your level of agreement with the statements given below by rating with an "X" against each item on the five-point Likert scale shown below.

1	2	3	4	5
Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree

Value-in-use	Items	1	2	3	4	5
Experience	I felt that learning in the classroom differed depending on my participation.					
	During the learning process in the classroom, I was able to do something useful for me by challenging new things.					
Personalization	During learning in the classroom, the professor tried to meet the individual needs of each student.					
	During learning in the classroom, I felt that participation in learning activities varied depending on my taste and knowledge.					
Relationship	During my learning activities in the classroom, I felt an intimate relationship with my major.					

	I participated in study groups, clubs, or networks that can become fans during learning activities in the classroom.					
	During the learning activities in the classroom, I felt that my relationship with my major or faculty could be improved.					

Student benefits: The outcome of value co-creation is student benefits arising from value propositions. These student benefits are measured by student immersion, satisfaction, loyalty and academic image. Please indicate your level of agreement with the statements given below by rating with an "X" against each item on the five-point Likert scale shown below.

Construct	Items	1	2	3	4	5
Student benefit	I was able to immerse myself in learning activities in the classroom that use technology.					
	I felt higher satisfaction in the classroom where learning activities employed technology.					
	I would recommend my programme to colleagues and friends.					
	I felt that my programme was enhanced through classroom learning activities that uses technology.					

Innovation competency: It is defined as comprising of three dimensions (called skills) individual, teamwork and networking.

Please assess your innovation competences (Personal dimension, Interpersonal dimension and Networking dimension) in the context of your daily studies during the classroom interaction with the teacher by rating with an "X" against each item on the five-point Likert scale shown.

1	2	3	4	5
I need to improve a lot	Average	Above average	Good	Excellent

Construct	Items	1	2	3	4	5
Personal dimension	I provide new ways to make the ideas materialise.					
	I critically assess the fundaments of contents and actions.					
	I am able to identify relationships among the various components of the task.					
	I deal with the task from different perspectives.					
	I could forecast how events will develop.					
	I exhibit enthusiasm.					
	I am able to take intelligent risks.					
	I direct the task to point towards the target.					
Interpersonal dimension	I communicate ideas effectively.					
	I pay attention to teammates.					
	I employ dialogue to develop effective group relationships.					
	I work together with team members actively.					
	I play a role in group functioning.					
	I encourage others to act.					
Networking dimension	I connect social impact to tasks.					
	I can function in cooperation in multidisciplinary/multicultural contexts.					
	I am able to use foreign languages while speaking.					
	I enable working relationships with actors engaged in local, regional or international endeavours.					

Individual innovation behaviour: It is defined as "the intentional creation, introduction and application of new ideas within a work role, group or organization, in order to benefit role performance, the group, or the organization".Please indicate your level of agreement with the statements given below by rating with an "X" against each item on the five-point Likert scale shown below.

1	2	3	4	5
Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree

Construct	Item	1	2	3	4	5
Individual innovation behavior	I generate creative ideas.					
	I promote and champion ideas to others.					
	I investigate and secure funds needed to implement new ideas.					

Thank you

Appendix VII – Pilot Survey Results

1.   Introduction

This research revolves around the value co-creation that occurs in a classroom in a higher education institution setting. A review of the literature indicated that value co-creation could occur in the classroom through an interaction between the instructor and the students. However, there is no clarity in the literature as to how co-creation could occur in a classroom setting when one considers the prospect of student innovation. In fact, the literature is silent on the predictors of co-creation when students innovate through interaction with instructors in the classroom. Some researchers have argued that such a possibility cannot be ruled out. This research investigates this aspect. Towards this end, the following research questions were formulated for this research:

- Research question 1 (RQ1): What factors contribute to the value co-creation process in a higher education institution during classroom interaction between instructors and students that support students to innovate/invent and how are they related to each other?

- Research question 2 (RQ2): What is the nature of the values co-created and how do they occur during the value co-creation process in a classroom?

- Research question 3 (RQ3): Are there levels under which students could be classified and engaged to innovate as part of the value co-creation process and if so how to classify the students according to different levels?

To answer the above questions a mixed method strategy was thought fit to answer the questions 'what' and 'how'. The question of 'what' was planned to be answered using a quantitative research method, while the question of 'how' was proposed to be answered using a qualitative research method which is consistent with the research methodology literature.

A conceptual model was developed to answer the research questions concerning the following by breaking down the research questions concerned with the question 'what' using the quantitative research method:
- What factors contribute to the value co-creation process in a higher education institution during classroom interaction between instructors and students that support students to innovate/invent?
- What is the nature of the values co-created during the value co-creation process in a classroom?
- Are there levels under which students could be classified and engaged to innovate as part of the value co-creation process?

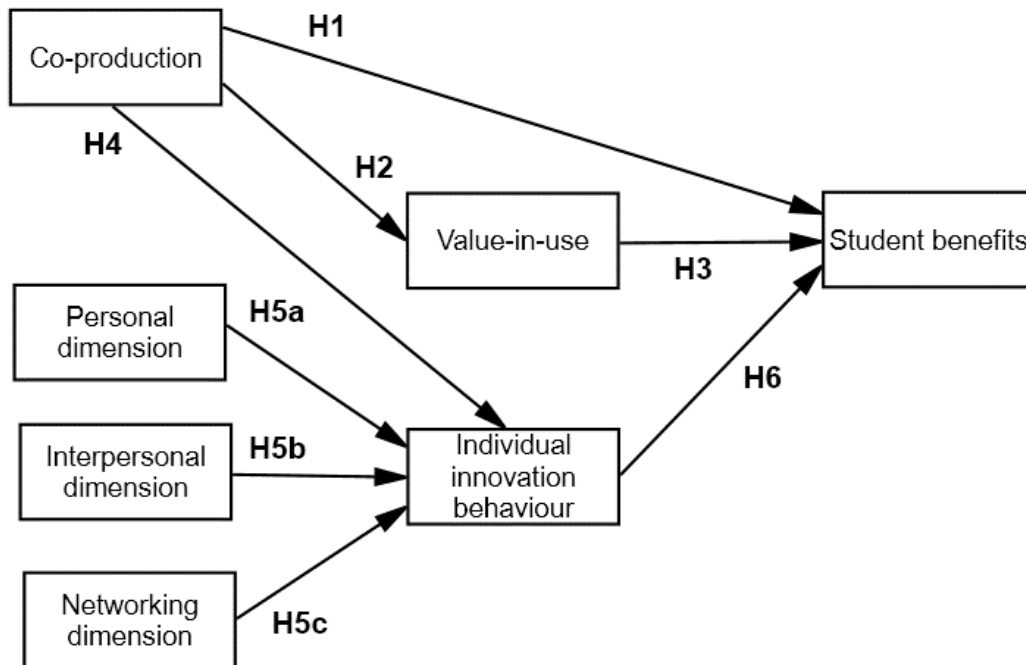The conceptual model is provided in figure 1 below.

Figure 1: Conceptual model

The research model comprises a dependent construct, namely, student benefits which is considered the value co-created during the innovation process that could occur in the classroom interaction process. The predictor variable is conceived to be co-production. The mediator variables are the value-in-use and individual innovation behaviour of students that mediate between the independent (co-production) and dependent (student benefits) variable that intervene in the value co-creation process. Three independent interventions that were identified as affecting the individual innovative behaviour of students were also included in the conceptual model to investigate how the individual innovation behaviour of students was influenced by specific behavioural factors that could contribute to co-creation.

The survey method was chosen as the strategy to collect data and answer the above questions. A research instrument was developed for this purpose, based on already tested and validated research instruments found in the extant literature. Complete details of the research instrument are provided at the end of this document. The details include the reference to the literature that enabled the researcher to develop the measures and the measurement scale for collecting the data. The target population was students currently studying in a chosen higher education institution in Bahrain. Students were randomly chosen regardless of their level in their academic journey and the programme they were studying currently. This provided a wide spectrum of students who could be investigated for understanding the value co-creation process in a university in the classroom setting. This report is restricted to the pilot survey analysis that was conducted to verify the initial reliability and validity of the research instrument. This step is supposed to provide the basis to accept the research instrument without any modification, or to modify the research instrument if reliability and validity concerns arise. The descriptive analysis provided the basis to know how the responses provided by the respondents have moved over the five-point Likert scale. The reliability of the instrument was checked using Cronbach's alpha; a widely used measure in the extant literature. In addition, internal consistency was also measured to check the reliability of the instrument which involved the measurement of the inter-item correlation and item-total correlation. SPSS version 21 was used to measure

Cronbach's alpha and the correlations. The minimum acceptable value of alpha set for this research was 0.7 while the inter-item correlation value was set at a minimum of 0.2 and item-total correlation set at a minimum of 0.5. The following are the results of the pilot survey, where the population from whom data was collected stood at 50. However, only 36 valid responses were obtained from the respondents. At the pilot survey stage 36 valid responses were considered adequate by researchers (Sekaran and Bougie, 2019) to determine whether the research instrument is reliable and valid for use in the main survey.

2.   Descriptive analysis

#	Constructs	Code	Items	Mean		Standard deviation (≤1.5)	
Number of participants 'n' = 36							
				Min	Max	Min	Max
1	Co-production	COPR	K1-K4	3.25	3.6944	0.82183	1.05221
			E1-E4	3.5	3.7500	0.76997	1.06421
			I1-I4	3.4722	3.7222	0.75593	1.05860
2	Value-in-use	VIU	X1-X3	3.4167	3.6667	0.80277	0.87423
			P1-P4	3.5	3.8056	0.74907	1.02817
			R1-R4	3.6667	3.8889	0.78478	0.90633
3	Student benefits	SB	B1-B4	3.5833	3.9444	0.75383	0.85449
4	Personal dimension	PD	ICB01-ICB12	3.1389	3.8056	0.79831	1.15573
5	Interpersonal dimension	ID	ICB13-ICB20	3.5833	3.9444	0.76997	1.01848
6	Networking dimension	ND	ICB21-ICB25	3.6667	3.8333	0.84515	1.12122
7	Individual innovation behaviour	IIB	IIB1-IIB6	3.7500	4	0.80623	0.98561

Table 1: Descriptive statistics

The standard deviation for all items is well within the widely accepted level of ±1.5. This shows that the responses are closer to the central point of 3 on the Likert scale indicating normal distribution of the data.

3.   Reliability analysis
The SPSS output with regard to the reliability test using Cronbach's alpha is provided in the table below.

#	Construct	Code	Items	Cronbach's alpha (≥0.7)	Inter-item correlation (≥0.3)		Item to total correlation (≥0.5)		Remarks
					Min	Max	Min	Max	
1	Co-production	COPR	K1-K4; E1-E4; I1-I4	0.912	0.205	0.688	0.535	0.780	All items were retained as item to total correlation values satisfy the limits. However, some of the inter-item correlation (K1-I2; K3-E3; K3-I3; K3-I4; E1-I1; E3-I2; I1-I4) values were found to be below the acceptable value of 0.3. At this stage the pairs of items contributing to lower correlation were still retained and kept under observation as the correlation could be lower because the sample size was very low.
2	Value-in-use	VIU	X1-X3; P1-P4; R1-R4	0.81	0.169	0.5	0.474	0.606	Items causing concern and deleted were X1, P1, P4 and R1. This improved the inter-item correlation and item to total correlation slightly. No other item was deleted further. The pair of items causing concern, namely (P3-X3, R4-R3, X2-R3, P2-X2), were still retained. The reason for this lack of inter-item and item to total correlation could be the low sample size. It is expected that with increase in sample size in the main survey the correlation figures could improve. Therefore, those pairs of items causing concern were retained. As for item to total, only one item was found cause concern that is R3 (0.474).
3	Student benefits	SB	B1-B4	0.774	0.235	0.649	0.472	0.736	All items were retained although some pair of items were cause of concern with regard to inter-item correlation and item-total correlation. The pair of items causing concern was B2-B3. This pair was put under observation to see its performance in the main survey when sample size is expected to be significantly higher than the pilot survey. Additionally, B3 (0.472) was causing concern with regard to the item to total correlation. However, it was retained for the same reason related to lower sample size used in pilot survey.
4	Personal dimension	PD	ICB01-ICB12	0.833	0.229	0.606	0.483	0.672	ICB01, ICB02, ICB07 and ICB10 were deleted. Other items were retained although a few pairs of items were still causing concern namely ICB03-ICB11, ICB06-ICB09, ICB06-ICB11, ICB08-ICB09 which contributed to lower item to item correlation. Further, although ICB09 causing concern with regard to item to total correlation (0.483) still it was retained as it is expected that with higher sample size this correlation could improve.
5	Interpersonal dimension	ID	ICB13-ICB20	0.831	0.265	0.669	0.467	0.752	ICB18 and 1CB20 were deleted. Other items were retained although ICB14-ICB17, ICB16-ICB17 were pairs causing concern with regard to items item to item correlation as it was expected to improve with higher sample size. Similarly, although ICB14 was causing concern with regard to item to total correlation (0.467) it was still retained as it was felt that the lower correlation could have been caused due to lower sample size.
6	Networking dimension	ND	ICB21-ICB25	0.782	0.342	0.649	0.541	0.659	ICB21 deleted as it was causing concern in regard to correlation. All other items retained.
7	Individual innovation behaviour	IIB	IIB1-IIB6	0.732	0.349	0.571	0.486	0.63	IIB1, IIB5 and IIB6 deleted due to problems caused by . IIB4 causing concern for item to total correlation (0.486).

Table 2: The final set of items retained for main survey based on reliability and internal consistency measurement.

From the table above, it is evident that the Cronbach's alpha for all the items used to measure different constructs were found to be higher than the minimum acceptable value of 0.7. It was concluded that the reliability of the research instrument was acceptable at the pilot survey stage. As for the internal consistency measurement, certain items were found to cause concern. However, items causing serious concern were deleted and those causing concern considered to occur due to sample size were retained. The explanations surrounding these are provided in the table above. Accordingly, at this stage, the items that were deleted and those retained led to the final instrument ready for use in the main survey.

4.   Validity

As for the validity three types of validity measures were checked. The content validity was checked, and some respondents have highlighted some concern with the text in a few places. This was reviewed and minor amendments have been made. The convergent validity, also called criterion validity, was measured using inter-item correlation. The accepted value for this measure is ≥0.3. There were a number of pairs of items (18 pairs of items) causing concern in relation to the inter-item correlation, and 14 items were deleted (X1, P1, P4, R1, ICB01, ICB02, ICB07, ICB10, ICB18, ICB20, ICB021, IIB1, IIB5 and IIB6) from the instrument. The other validity measure checked was construct validity which was tested using the item-total correlation. The accepted value of item to total correlation usually suggested by researchers is ≥ 0.5. Some items were causing concern and those items that caused concern were checked with those items causing concern when measured for inter-item correlation. The items that caused concern while measuring both inter-item and item to total correlation were immediately deleted. However, those that were not common but found in the borderline of the accepted level of correlation, were retained for observation during the main survey. The researcher decided to delete those items that were considered to be causing serious concern. Certain other items even though were found to cause concern since the correlation values were found to be closer to the acceptable level and based on the arguments of other researchers who state that correlation measurement is dependent on sample size, the researcher decided to retain them to see how those items perform during the main survey when the sample size is expected to be high. Following the deletion of items that caused concern, a final research instrument was prepared. This instrument will be used to launch the main survey.

Original research instrument used in the pilot survey

Section 1: Demographic variables

1. Gender:

Male	Female

2. Please choose your level of interest in participating in innovation in the classroom

Level 1	Level 2	Level 3
Fully interested	Partially interested	Not interested

3. Programme in which enrolled

#	Programme	Tick
1	Bachelor's Degree in Accounting & Finance (BSAF)	
2	Bachelor's Degree in Banking & Finance (BSBF)	
3	Bachelor's Degree in Computer and Communication Engineering (BSCCE)	
4	Bachelor's Degree in Economics & Finance (BSEF)	
5	Bachelor's Degree in Information Technology (BSIT)	
6	Bachelor's Degree in Management & Marketing (BSMM)	
7	Bachelor's Degree in Management Information Systems (BSMIS)	
8	Bachelor's Degree in Mass Communication & Public Relations (BSMCPR)	
9	Bachelor's Degree in Mobile and Network Engineering (BSMNE)	
10	Bachelor's Degree in Multimedia Systems (BSMS)	
11	Bachelor's Degree in Interior Design (BSID)	

Section 2:

Value co-creation

Co-creation of values consists of the coproduction of values generated by value propositions and the concept of value-in-use. Students' value co-creation is said to occur in an academic environment when the three constructs namely co-production, value-in-use, and student benefits are derived during the process of active participation in the classroom.

Please indicate your level of agreement with the statements given below by rating with an "X" against each item on the five-point Likert scale shown below.

1	2	3	4	5
Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree

Co-production: Co production in higher education is defined as the participation of students and faculty during the service process and their cooperation directly or indirectly, and suggests that it can consist of information access, dialogue, and control).

Constructs	Items					
Co-production		1	2	3	4	5
Knowledge sharing	K1 The faculty was open to my ideas and suggestions for existing or new learning content.					
	K2 The faculty provided enough explanation and information for me to learn.					
	K3 I was willing to spend my time and effort to share my ideas and suggestions for learning with the faculty.					
	K4 The faculty provided an appropriate environment and opportunity for me to offer my suggestions and ideas.					
Equity	E1 I could easily access the learning content provided by the faculty was according to my interest level.					
	E2 The learning content provided by the faculty was consistent with my learning needs.					
	E3 I thought my role was important in the classroom learning process.					
	E4 The faculty and I used the best communication channels to share learning results.					
Interaction	I1 I was able to express my needs conveniently during the learning process in the classroom.					
	I2 The faculty gave me enough information related to learning in the classroom.					
	I3 Me and the faculty interacted sufficiently during the learning process in the classroom.					
	I4 During the course of learning in the classroom, I played an active role in interacting with faculty members to get knowledge.					

Value-in-use (ViU): It indicates how to consume or use value propositions provided by consumers' time, place and experience and hence part of value co-created to use what is co-produced by consumers and organisations.

Please indicate your level of agreement with the statements given below by rating with an "X" against each item on the five-point Likert scale shown below.

1	2	3	4	5
Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree

Value-in-use	Items	1	2	3	4	5
Experience	X1 Learning in the classroom was a fresh and memorable experience for me.					
	X2 I felt that learning in the classroom differed depending on my participation.					
	X3 During the learning process in the classroom, I was able to do something useful for me by challenging new things.					
Personalisation	P1 I felt that the benefits, values, or enjoyment of learning in the classroom depends on my role and environment.					
	P2 During learning in the classroom, the professor tried to meet the individual needs of each student.					
	P3 During learning in the classroom, I felt that participation in learning activities varied depending on my taste and knowledge.					
	P4 The classroom provided a good overall learning experience beyond functional benefits.					

Relationship	R1 I felt that the university needed innovation related promotional activities in order for students to be completely immersed in learning activities in the classroom.					
	R2 During my learning activities in the classroom, I felt an intimate relationship with my major.					
	R3 I participated in study groups, clubs, or networks that can become fans during learning activities in the classroom.					
	R4 During the learning activities in the classroom, I felt that my relationship with my major or faculty could be improved.					

Student benefits: The outcome of value co-creation is student benefits arising from value propositions. These student benefits are measured by student immersion, satisfaction, loyalty and academic image. Please indicate your level of agreement with the statements given below by rating with an "X" against each item on the five-point Likert scale shown below.

Construct	Items	1	2	3	4	5
Student benefits	B1 I was able to immerse myself in learning activities in the classroom that use technology.					
	B2 I felt higher satisfaction in the classroom where learning activities employed technology.					
	B3 I would recommend my programme to colleagues and friends.					
	B4 I felt that my programme was enhanced through classroom learning activities that uses technology.					

Innovation competency: It is defined as comprising of three dimensions (called skills) individual, teamwork and networking.
Please assess your innovation competences (Personal dimension, Interpersonal dimension and Networking dimension) in the context of your daily studies during the classroom interaction with the teacher by rating with an "X" against each item on the five-point Likert scale shown.

1	2	3	4	5
I need to improve a lot	Average	Above average	Good	Excellent

Construct	Items	1	2	3	4	5
Personal dimension	ICB01 I make proposals that fit the demands of the task.					
	ICB02 I provide ideas that are original in content.					
	ICB03 I provide new ways to make the ideas materialise.					
	ICB04 I critically assess the fundaments of contents and actions.					
	ICB05 I am able to identify relationships among the various components of the task.					
	ICB06 I deal with the task from different perspectives.					
	ICB07 I employ resources ingeniously.					
	ICB08 I could forecast how events will develop.					
	ICB09 I exhibit enthusiasm.					
	ICB10 I could be tenacious.					
	ICB11 I am able to take intelligent risks.					
	ICB12 I direct the task to point towards the target.					
Interpersonal dimension	ICB13 I communicate ideas effectively.					
	ICB14 I pay attention to teammates.					
	ICB15 I employ dialogue to develop effective group relationships.					
	ICB16 I work together with team members actively.					
	ICB17 I play a role in group functioning.					
	ICB18 I am able to take initiatives.					
	ICB19 I encourage others to act.					
	ICB20 I face problems constructively to facilitate reaching a consensus.					
Networking dimension	ICB21 I employ ethical values.					
	ICB22 I connect social impact to tasks.					
	ICB23 I can function in cooperation in multidisciplinary/multicultural contexts.					
	ICB24 I am able to use foreign languages while speaking.					

	ICB25 I enable working relationships with actors engaged in local, regional or international endeavours.					

Individual innovation behaviour: It is defined as "the intentional creation, introduction and application of new ideas within a work role, group or organization, in order to benefit role performance, the group, or the organization".Please indicate your level of agreement with the statements given below by rating with an "X" against each item on the five-point Likert scale shown below.

1	2	3	4	5
Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree

Construct	Item	1	2	3	4	5
Individual innovation behaviour	IIB1 I search out new ideas and opportunities.					
	IIB2 I generate creative ideas.					
	IIB3 I promote and champion ideas to others.					
	IIB4 I investigate and secure funds needed to implement new ideas.					
	IIB5 I develop adequate plans and schedules for the implementation of new ideas.					
	IIB6 I am innovative.					

Thank you

Appendix VIII – Semi-structured Interview Questions

Q1: Value co-creation is a process that is said to occur in higher education institutions during the classroom interaction that takes place between instructors and students.

- Could you please explain whether you can relate this definition to the classroom interaction that takes place between instructors and students?
- What are the roles of the instructors and students in relation to innovation?
- Could you please explain whether invention or innovation occurs during the classroom interaction that takes place between instructors and students?
- Do you think all students could innovate or invent? Or do you believe that students can be classified under levels and accordingly involved in the value co-creation process? If they can be classified what is your idea on how to classify the students and how many levels could be used?
- Could you please give examples of topics that could be discussed in the classroom that can engage students to innovate or invent?
- Do you think the courses offered in higher education institutions, the teaching process, learning process and assessment process in a classroom support innovation or invention?

Q2: There are factors that can be related to value co-creation during the course of classroom interaction concerning students involved in innovation. For example, co-production, value-in-use, individual innovation behaviour and student benefits are considered as factors that occur during value co-creation.

- Do you feel that these aspects occur in a classroom interaction? If so what types of courses help in producing those factors? Do you feel there are obstacles for this to occur?

Q4: With regard to co-production, three components were identified in this research as contributing to it. These are knowledge sharing, equity and interaction.

- Do you think these aspects occur in a classroom interaction? Could you explain your view on whether these aspects lead to co-production of value-in-use, individual innovation behaviour and student benefits? Could you please give examples for each one of them?

Q5: As far as value-in-use is concerned three components were identified in this research as contributing to it. These are experience, personalisation and relationship.

- Do you think these aspects occur in a classroom interaction? Could you explain your view on whether these aspects are linked to value-in-use? Could you give examples please for each one of them?

Q6: With regard to individual innovation behaviour three components were identified in this research as contributing to it. These are the personal dimension, interpersonal dimension and networking.

- Do you think these aspects occur in a classroom interaction? Could you explain your view on whether these aspects are linked to individual innovation behaviour? Could you please give examples for each one of them?

Q7: With regard to student benefits, they are found to be co-created during the classroom interaction.

- Please explain how this occurs and give examples.

Q8: Do you think co-production could influence student benefits, value-in-use and individual innovation behaviour directly and if so, could you please give examples and explain how it happens?

Q9: Do you think value-in-use could influence student benefits and individual innovation behaviour directly and if so, could you please give examples and explain how it happens?

Q10: Do you think individual innovation behaviour could influence student benefits directly, and if so, could you please give examples and explain how it happens?

Thank you.

Appendix IX – Value-in-use Conceptualisations

Definition	Type	Author(s)
"The value that emerges, is created or realised by the customer during their usage of resources" (p. 1101)	Empirical	(Sweeney et al., 2018)
"The value-in-use perspective views value as an outcome (e.g., a new product or service) of a process (e.g., contributing to an open-innovation project) that consumes resources (e.g., human resources). The applied ("used") resources constitute the sacrifices and the achieved outcomes are the benefits." (p. 932)	Conceptual	(Chesbrough et al., 2018)
"Value-in-use from a service perspective is regarded as the achievement of a consumer outcome through service, in which service involves the resources that actors use to deliver value" (p. 57)	Empirical	(Gordon et al., 2018)
"According to the value-in-use definition, value is created through the customer's usage over time." (p. 7)	Conceptual	(Foglieni and Holmlid, 2017)
"The value for customers created by them during their usage of resources. Value is both created and determined by customers" (p. 381)	Empirical	(Ng et al., 2016)
"ViU (Value-in-use) is the customer's experiential evaluation of the product or service proposition beyond its functional attributes and in accordance with his/her individual motivation, specialized competences, actions, processes, and performances." (p. 293)	Empirical	(Ranjan and Read, 2016)
"We define value in use as all customer-perceived consequences arising from a solution that facilitate or hinder achievement of the customer's goals." (p. 98)	Empirical	(Macdonald et al., 2016)
"Whereas value-in-exchange represents the nominal amount for which something can be exchanged, value-in-use represents the value derived through integration and use, or application, of an available resource." (p. 211)	Conceptual	(Akaka et al., 2015)
"……value is attained from the use of an offering aimed at achieving customer goals" (p.247)	Conceptual	(Smith et al., 2014)
"The definition of value-in-use comes close to the customer perceived value concept and refers to the final outcome and purpose of the value co-creation process. In other words, benefits and sacrifices generate value-in-use for the customer that emerges during and after the service process" (p. 240)	Empirical	(Komulainen, 2014)
"Value-in-use is the value for customers, created by them during their usage of resources. Value is both created and determined by the customers." (p. 209)	Conceptual	(Grönroos and Gummerus, 2014)
"The nature of value-in-use instead is the extent to which a customer feels better off (positive value) or worse off (negative value) through experiences somehow related to consumption." (p. 136)	Conceptual	(Grönroos and Voima, 2013)
"Value is transformed from a proposition into a perception by the customer when all resources are integrated through customer use, consumption or experience, and is therefore "value-in-use"." (p.4)	Empirical	(Hilton et al., 2013)
"'In-use' not only denotes physical use but also mental use and even possession. Hence, value-in-use can emerge from both physical and mental use of a resource or from mere possession of it." (p. 1520)	Conceptual	(Grönroos, 2012)
"In-use value (consisting of emotional, esteem, monetary, convenience, and performance value) stems from a person's experience of using a specific service." (p. 526)	Empirical	Gummerus and Pihlström, 2011)
"The customer's functional and/or hedonic outcome, purpose or objective that is directly served through product/service usage" (p. 847)	Conceptual	(Lemke et al., 2011)

"Value is derived from an outcome of a process in which customers integrate and use available resources, including their own knowledge, skills and motivations." (p. 542)	Empirical	(Edvardsson et al., 2011)
"We define value-in-use as a customer's outcome, purpose or objective that is achieved through service." (p. 671)	Empirical	(Macdonald et al., 2011)
"We argue that value-in-use should be seen as everything that the company does that the customer can use in order to improve his life or business." (p. 543)	Conceptual	(Heinonen et al., 2010)
"Use-value was recognized as a collection of substances or things and the qualities associated with these collections." (p. 146)	Conceptual	(Vargo et al., 2008)
"Value for customers means that after they have been assisted by a self-service process (cooking a meal or withdrawing cash from an ATM) or a full-service process (eating out at a restaurant or withdrawing cash over the counter in a bank) they are or feel better off than before." (p. 303)	Conceptual	(Grönroos, 2008)
"Value in use is the evaluation of the service experience, i.e., the individual judgment of the sum total of all the functional and emotional experience outcomes. Value cannot be predefined by the service provider, but is defined by the user of a service during the user consumption." (p. 120)	Conceptual	(Sandström et al., 2008)
"Value is idiosyncratic, experiential, contextual, and meaning laden." (p. 7)	Conceptual	(Vargo and Lusch, 2008)
"Value-in-exchange might represent expected utility but it is not the actual utility; utility (value-in-use) can only be realized by and in the context of the life of the customer—that is, customers are not value destroyers (consumers), but rather value creators." (p. 12)	Conceptual	(Moeller, 2008)
"Value-in-use, the value that originates from in usage" (p. 205)	Conceptual	(Moeller, 2008)
"……the value of the experience derived from goods is determined at time of use by customers, as value-in-use." (p. 363)	Conceptual	(Ballantyne and Aitken, 2007)
"……, so that the service value is determined at the time of its use, as value-in-use." (p. 336)	Conceptual	(Ballantyne and Varey, 2006)
"Value can only be created with and determined by the user in the 'consumption' process and through use or what is referred to as value-in-use" (p. 284)	Conceptual	(Lusch and Vargo, 2006)
"Value refers to a customer's meaning attached to product/service bundles relative to a use context." (p. 185)	Conceptual	(Woodruff and Flint, 2006)
"Value was considered the comparative appreciation of reciprocal skills or services that are exchanged to obtain utility; value meant "value in use" (p. 7)	Conceptual	(Vargo and Lusch, 2004)
"Value-in-use, as the name suggests is a functional outcome, a goal purpose or objective that is served directly through product consumption." (p. 162)	Conceptual	(Payne and Holt, 2001)
"In-use value, utility derived from using the product/service" (p. 169)	Conceptual	(Parasuraman and Grewal, 2000)
"Use value refers to the specific qualities of the product perceived by customers in relation to their needs: e.g., the acceleration and styling of the car, the taste and texture of the apple, etc." (p. 2)	Conceptual	(Bowman and Ambrosini, 2000)
"Customer value is a customer's perceived preference for and evaluation of those product attributes, attribute performances, and consequences arising from use that facilitate (or block) achieving the customer's goals and purposes in use situations." (p. 142)	Conceptual	(Woodruff, 1997)
"Value in use reflects the use of the product or service in a situation to achieve a certain goal or set of goals." (p. 170)	Conceptual	(Flint et al., 1997)

(Source: Yi Zou, 2021)

Appendix X – SEM Terminology

No.	Term	Interpretation
1.	Observed variable (Manifest variable)	Variables that are measured effectively like using a Likert scale. These are referred to as items or questions. They are also referred to as indicators.
2.	Non-observed variable (latent variable)	These variables are not measured directly. These variables are measured or estimated based on the score for and the variance of the observed variable.
		Latent variables are those which are theoretical constructions of manifest variables. Latent variables equate to factors in factor analysis.
3.	Endogenous variables	Variables that are of interest and are explained within the constraints of the model being tested.
		These variables equate with dependent variables in multiple regression analysis.
4.	Exogenous variables	Variables used to explain relationships within the model.
		These variables equate with independent variables in multiple regression analysis.
5.	Non-recursive models	Models that have bidirectional "causal" relationships, that is, feedback loops, correlated error terms, or both.
6.	Recursive models	Variables that have unidirectional "causal" relationships and independent error terms.
7.	Moderators	Variables that interact with the relationship of one variable's impact on another's.
8.	Mediators	Variables that affect the relationship between two other variables. Mediators come between two variables such that the first variable has an indirect effect on the second variable, through its direct effect on the mediator.
9.	Error term	Non-observable; determine the unique variance of a variable.
10.	Double pointed arrows	Indicate correlations and covariances.
11.	Single pointed arrows	Indicate causal effects

Appendix XI – Chi-square Difference

#	Model 1			Model 2			Difference in CMIN/DF between Models 1 and 2	Difference in DF between Models 1 and 2	Latent constructs' pair under assessment
	CMIN/DF	DF	p-value	CMIN/DF	DF	p-value			
1	4.267	54	0	1.579	53	0.005	2.688	1	COPROD-ID
2	6.099	65	0	1.482	64	0.007	4.617	1	COPROD-PD
3	6.797	44	0	1.869	43	0	4.928	1	COPROD-ND
4	5.737	44	0	1.752	43	0.002	3.985	1	PD-ID
5	8.411	27	0	1.899	26	0.004	6.512	1	ND-ID
6	14.052	35	0	2.346	34	0	11.706	1	PD-ND