



Factors affecting senior managers' decisions when implementing Management Information Systems
(MIS) in UK manufacturing organisations

A thesis submitted for the degree of Doctor of

Philosophy by

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Abstract

Management Information Systems (MIS) play an important role in all manufacturing organisations but specifically in the UK manufacturing context where the majority of organisations are still at early stages of implementation. Senior managers' attitude toward MIS implementation is an important determinant of successful implementation which contributes to saving a large amount of money and time. Surprisingly, however, there is only limited research about the predictors of senior managers' attitude toward MIS implementation. This research aims to address this gap by using the Upper Echelon Theory (UET) as the theoretical lens to investigate the predictors of senior managers' attitude. According to UET, which was proposed by Hambrick and Mason (1984), senior managers make their strategic decisions based on their experiences, beliefs, and personality traits. Senior managers' demographic characteristics including age, tenure, prior career experience, education background and their personality traits can be used as tools to measure their experiences and beliefs. A sequential mixed method data collection strategy including 400 surveys (Study 1), 12 in-depth semi-structured interviews (Study 2), and 96 surveys (Study 3), all from board level senior managers of UK manufacturing organisations, were used to collect data.

The findings showed that senior managers' tenure, career variety, holding at least a college degree, and prior involvement in IS projects have significant impact on their attitude toward MIS implementation. In the first study, senior managers' personality traits was measured by positive self-image (Core Self-Evaluation scale). It is found that senior managers' positive self-image is the strongest predictor of their attitude toward MIS implementation and their attitude mediates the relationship between their characteristics and their support toward MIS implementation. It is found that four of the elements of the Big Five i.e., Agreeableness, Conscientiousness, Extraversion and Emotional stability have a significant impact on senior managers' attitude toward MIS implementation. Agreeableness and Conscientiousness appear to be the personality constructs which most strongly and consistently have an impact on senior managers' attitude toward implementation. Only Openness to experience appears not to have a significant impact on attitude.

The findings also suggest that in presence of the Big Five, the impact of positive self-image (PSI) on senior managers' attitude toward MIS implementation is substantially reduced. This could be explored further in future studies. Although PSI is not as commonly used as the Big Five, it is much shorter and therefore reduces completion time, practitioners are still able to use it to assess personality traits of senior managers in early stages of recruitment and selection process. These findings have significant implications

for organisations appointing a board level senior manager or redeploying a current senior manager since the organisations can focus more particularly on the senior managers' personality traits in their recruitment criteria. HR practitioners can use senior managers' demographics i.e., tenure, highest level of education, career variety, prior involvement in IS projects and experiences as selection tools to guarantee future firm performance. This study helps to describe the types of senior managers who hold positive beliefs about MIS implementation. The manufacturing organisations could look for these traits as part of a broader selection process by using established Big Five selections tests. The results of the present study advance the Upper Echelon Theory and field of study by increasing the predictive power of senior managers' attitude toward the MIS implementation model, while enabling researchers to have a better understanding of the decision making process of senior managers.

Keywords: MIS implementation, Information systems, senior managers, CEOs, level of support, attitude, Upper Echelon Theory, personality traits, Big Five

Statement of originality

This work has not been previously submitted for a degree or diploma in any university. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made within the thesis itself.

Nahid Izadpanah Mehrkish

July 2023

Ethics clearance

This research received ethics clearance approval from the Brunel University London human research ethics (23148-LR-Jun/2020- 25887-4) on 18 June 2020; (reference: 32637-LR-Oct/2021- 34559-2) on 22 October 2021; (Reference: 36559-LR-Mar/2022- 38901-1) on 21 April 2022 between 21/04/2022 and 31/08/2022; (Reference: 36559-A-Sep/2022- 41572-1) on 20th September 2022 between 20/09/2022 and 15/11/2022.

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Publications generated from this study

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List of main abbreviations

A: Agreeableness

AVE: Average Variance Extracted

C: Conscientiousness

CB–SEM: Covariance –based Structural Equation Modelling

CR: Composite Reliability

E: Extraversion

IS: Information Systems

IT: Information Technology

MIS: Management Information Systems

N: Neuroticism

O: Openness to experience

PLS–SEM: Partial Least Squares Structural Equation Modelling

PSI: Positive Self-Image

RQ: Research Question

SEM: Structural Equation Modelling

SMS/ TMS: Senior Management Support

SPSS: Statistical Package for Social Science

SMT/TMT: Senior Management Team

UET: The Upper Echelon Theory

VIF: Variance Inflation Factor

Chapter 1: Literature review and hypotheses development

Introduction

Management Information Systems (MIS) is a field of IS which deals with both behavioural and technological issues surrounding the use of IS (its development, use and impact) by managers and employees. MIS plays a role in different aspects of an organisation such as operations, finance, decision making, project management, competitive advantage, human resources, etc. (Galliers and Currie, 2011). MIS is designed to help managers and employees by processing very large quantities of information and providing managers with essential information regarding cost and operations related to an organisations' competitive position (Beheshti, 2006) so that managers can make better strategic decisions (Vieru and Rivard, 2014). MIS implementation is an important competitive factor for firms and if the implementation is not successful, it may end in loss of money, devaluation on the stock market and difficulty competing with other similar businesses.

What is the role of senior managers in Management Information Systems (MIS) implementation? To address this question, a significant amount of research has been done based on the Upper Echelon Theory (UET) which suggests that senior managers' characteristics influence their strategic decision making and consequently impact on their businesses' performance. According to UET which was proposed by Hambrick and Mason (1984), senior managers make their strategic decisions based on their experiences, beliefs, and personality traits. Senior managers' demographic characteristics including age, tenure, prior career experience, education background and their personality traits can be used as tools to measure their experiences and beliefs. Several studies have investigated the impact of these characteristics on firm performance and outcomes. Although personality traits have been widely used to predict individuals' behaviours, attitudes and cognition in management and psychology research, they have largely been ignored in the MIS field. MIS plays an important role in manufacturing organisations especially in the UK manufacturing context where the majority of organisations are still in the early stages of implementation. Understanding predicting factors of senior managers' decision to implement MIS would help UK manufacturers to have a successful implementation process which will have various advantages for their businesses such as, increased productivity, efficiency, effectivity, etc. Hence, there is a need to investigate how senior managers' characteristics and their personality traits impact their decision to implement MIS. This research investigates the impact of senior managers' demographic characteristics

(i.e., age, tenure, formal education, career variety and prior involvement in IS projects) and their personality traits on their attitude toward MIS implementation. In this chapter, the key arguments as found in current literature related to this study are presented. Also, the gaps in the literature which have led to the formulation of the hypotheses are discussed. The literature review specifically aims to provide an overview of senior managers' support of MIS implementation and theoretically identify the key contributing factors of senior managers' attitudes. The rest of the chapter presents hypotheses development to address the four research questions of this study.

Literature review

In order to objectively report the current knowledge on senior managers' decision to support Management information systems (MIS) in the UK manufacturing organisations and base this summary on previously published research (e.g., Hambrick, (2007); Wang et al, (2016); Lee, Sun and Moon (2018) etc.), narrative overviews (also called unsystematic narrative reviews (Oxman, 1994) were conducted. This specific technique was chosen to provide the reader with a thorough overview of the topic and help put the information into perspective.

Methods

Sources of information

To identify papers on senior managers' decision to implement MIS in the UK manufacturing organisations, the first methodological step taken was a keyword search in electronic databases. Since this study focuses on both MIS and personality traits, databases that include psychology and related topics were also chosen as appropriate databases. 'Scopus', 'Elsevier', 'Emerald Insight', 'Annual reviews', 'APA PsycInfo', 'Business Source Premier', 'Academic Search Complete', 'SAGE journals', 'Science Direct', 'Springer Link', 'Taylor & Francis Journals', 'Web of Science', 'Wiley Online Library' were chosen. The Manufacturer website was also selected since it is the premier industry publication providing news and articles about UK manufacturing industry. The website of the Office for National Statistics (ONS) was also searched since it is the UK's largest independent producer of official statistics. Table 1 shows the keywords that were used to operationalise each concept. The use of asterisks allowed for different word endings. For example, the keyword 'small firm*' captured both 'small firms' and 'small firm'. The databases were searched using the key words 'Theory of Planned Behaviour' and 'innovation'. Since such a study on senior managers' decisions to implement MIS in the UK manufacturing organisations has not yet been published, no restrictions in terms of the year of publication were introduced. Thus, all academic articles published until 2022 (the year this study was undertaken) were considered in the keyword search.

Table 1: keywords that were used to operationalise each concept

Concept	keywords
MIS	('Manage* Information Systems' OR 'MIS' OR 'ERP' OR 'Enterprise resource planning' OR 'CRM', 'customer relationship management' OR 'supplier relationship management' OR 'SRM' OR 'information systems' OR 'IS' OR 'information technolog*' OR 'IT'
Implementation	'implement*'OR 'adapt*'
SMEs	' Small to medium-sized enterprises' OR 'SMEs' OR 'small company*' OR 'Medium compan*' OR 'small firm*' OR 'Small organi*ations' OR 'medium organi*ations'
UK	'United Kingdom' OR 'UK' OR 'England' OR 'English' OR 'Scotland' OR 'Ireland'
Senior managers	'senior manage*' OR 'top manager*' OR 'top manage* team' OR 'TMT' OR 'CEO' OR 'CFO' OR 'Executive officer' OR 'CIO'
Personality	'personality' OR 'the Big Five' OR 'Five Factor Model' OR 'FFM' 'Core Self-Evaluation' OR 'CSE', 'positive self-image' OR 'positive self-belief' OR 'locus of control' OR 'self-esteem' OR 'self-efficacy', 'emotional stability' OR 'Neuroticism' OR 'Extraversion' OR 'Openness' OR 'Openness to experience' OR 'Agreeableness' OR 'Conscientiousness'
Decision	'Naturalistic Decision Making', 'NDM', 'bounded rationality', 'decision making', 'organa*ional decision making

Selection criteria

Papers with impact factor lower than 1 were excluded from this review in order to only include papers from high quality journals. The quality of a research work can be evaluated by the number of citations with an emphasis on peer review. A simple indicator of the long-term citation count of an article is the impact factor of the journal publishing the article (Huang, 2016; Waltman, 2016). However, some authors (e.g., (Waltman and van Eck (2012); Leydesdorff and Opthof (2011)) raised some concerns regarding the use of impact factor to measure the quality of an article. This is because the average citations per article in a journal and the citations of a particular article can be fluctuated largely. Moreover, a journal paper published in a journal with low impact factor might have more citations than an article published in a high impact factor journal. Overall, impact factor can still be a preferable measure to evaluate the quality of an article (Huang, 2016). Non-English studies were also excluded. Peer review academic journals and books were included.

Management Information System (MIS)

An information system (IS) is 'a set of components that collect, process, store and distribute information' to enable decision making and control in an organisation (Laudon and Laudon, 2020, p. 48) or supply chain (Grant, 2016). Management, organisations and information technology are the three components of IS. Information technology (IT) is the hardware and software an organisation needs to use in order to achieve its business objectives (Laudon and Laudon, 2020). The first emergence of management information system (MIS) dates back to the 1960s through the teaching and writing of researchers (Wagner and Newell, 2011). Laudon and Laudon (2020) defined MIS as the field of IS which deals with both behavioural and technological issues surrounding the use of IS (its development, use and impact) by managers and employees. MISs play a role in different aspects of an organisation such as operations, finance, decision making, project management, competitive advantage, human resources, etc. (Galliers and Currie, 2011). MIS is designed to help managers and employees by processing very large quantities of information and providing managers with essential information regarding cost and operations related to an organisations' competitive position (Beheshti, 2006) so that managers can make better strategic decisions (Vieru and Rivard, 2014). MIS also improve organisational performance and responsiveness by highlighting inefficiencies and enabling appropriate resource allocation (Charamis, 2018), which can help organisations maintain and improve their profitability. By way of illustration, Charamis (2018) reported

significant growth in profitability and decrease in operational costs in UK and Greece textile manufacturing as a result of using Enterprise Resource Planning (ERP) systems.

Significant numbers of organisations are not able to operate successfully and adequately without the availability of MIS. This is due to a growing interdependence between an organisations' ability to implement their strategies and achieve their goals and their ability to use MIS (Laudon and Laudon, 2020). Organisations use MIS applications to improve their performance and decision making. These applications include enterprise systems, customer relationship management (CRM), supplier relationship management (SRM), knowledge management, e-commerce applications, etc. (Laudon and Laudon, 2020). Enterprise systems, also known as ERP, are a set of software modules and a central database through which different functional areas of an organisation (i.e. finance, human resources, sales and marketing, manufacturing and production) can share data (Laudon and Laudon, 2020). SAP and Oracle ERP are software packages that are used commercially to fully integrate all parts of a business, such as operations process schedule, inventory record, customer orders and financial management, into a digital platform. Both SAP and Oracle are globally well respected ERP providers (Prasetyo and Soliman, 2021). They enable organisations to collect business information from different departments in a single data repository and generate reports to facilitate business procedures, which consequently result in price reduction, saving time, increased productivity, and better customer service (Elbahri *et al.*, 2019).

The benefits of ERP systems may vary from one firm to another (Ali and Miller, 2017). ERP integrates data from different departments which reduces redundancy and inaccuracy of data because data is entered once and all departments are then able to access that data at the same time, which will result in better strategic alignment of marketing and operations. This opens up communications between marketing and operations i.e. marketing can communicate with operations about its needs including new product development and be informed about current operations (Calantone, Dröge and Vickery, 2002). In their empirical study, Sardana, Terziovski and Gupta (2016) found that strategic alignment of manufacturing, marketing, and other functions has a positive impact on firm performance. This is because when manufacturing operations develop to meet the market needs such as customers' customisation demand, this will positively impact firm performance. There is evidence in the literature that marketing and operations integration has a positive impact on on-time delivery, short lead time, product planning, new product development, and just-in-time implementation (Tatikonda and Montoya-Weiss, 2001; Sawhney and Piper, 2002). ERP also enables organisations to update or reengineer their business processes by identifying areas of operations which need improving and thus produces higher profitability and efficiency

(Beheshti, 2006). ERP allows organisations to decrease the cost of their inventory and provide better management of customer relationships and the supply chain. For example, Kohler Co. is a large manufacturer of kitchen and bath goods which employs an ERP system to track its products in the shipping process, predict monthly sales, resolve order issues, and guarantee on-time product delivery (Beheshti, 2006). The process of MIS implementation can involve changes in hardware, software, telecommunications and databases (Laudon and Laudon, 2020). It is predicted that global investment in IS will grow to \$6.2 trillion in 2023 (Laudon and Laudon, 2020). This shows that more companies will invest in IS and if companies fail to implement IS, they could diminish their competitive advantage. Therefore, there is a need for further investigation of MIS implementation in manufacturing organisations.

Although, in the past manufacturing organisations have adopted various methodologies to improve their operations management, such as ERP, CRM, SRM and more recently Industry 4.0, many manufacturing organisations are still at relatively early stages of implementing such technologies (Buer *et al.*, 2020). According to the holistic definition of CRM proposed by Richards and Jones (2008, p. 121), CRM is “a set of business activities supported by both technology and processes that is directed by strategy and is designed to improve business performance in the area of customer management”. Amoako-Gyampah *et al.* (2019) define SRM as a business process that includes all the long-term contracts and shared information between organisations and their suppliers. In their broad but coherent definition, Nosalska *et al.* (2019, p. 849) define Industry 4.0 as “a concept of organizational and technological changes along with value chain integration and new business model development that are driven by customer needs and mass customization requirements, and enabled by innovative technologies, connectivity, and IT integration”.

Many IS projects are considered a failure if they do not achieve organisation goals and finish on time within the approved budget (Amid, Moalagh and Zare Ravasan, 2012). This shows that organisations are struggling to implement MIS successfully. Studies by (Somers and Nelson, 2001; Ehie and Madsen, 2005; Kappelman, McKeeman and Zhang, 2006; Iacovou and Nakatsu, 2008; Agarwal and Garg, 2012; Almajali, Masa'deh and Tarhini, 2016; Ali and Miller, 2017) show that senior managers are one of the most important factors in successful MIS implementation as they can assist in providing essential resources such as IT, facility, human resources, and capital (Young and Jordan, 2008).

The term ‘MIS’ will be used solely referring to ERP, CRM and SRM because they are the most commonly used systems in organisations and their supply chains (Guerola-Navarro *et al.*, 2021; Mullins and Cronan, 2021). MIS identify pathways for companies in collecting and gathering the data that is generated. MIS is

also used to give information to managers about the performance of employees. An MIS gathers data from many internet sources, analyses the collected information and provides evidence that business managers can use for decision making (Fountas *et al.*, 2015). MIS are used for tracking current assets including sales, inventory and equipment. For example, comparing sales of the current month to the sales in the same month a year ago and comparing equipment purchased in the previous year with the current year. Information in an MIS can show actual data and compare them to planned results. Moreover, MIS receives data from organisation units with different functions (Laudon and Laudon, 2020). Some of the data in MIS are gathered automatically and others are collected manually at periodic intervals. At intervals, routine reports can be preprogramed or run on demand. Other routine reports are acquired by using built in query languages. MIS systems are used by management to provide past, present and predicted information. The task of the MIS is to focus on the information and technology infrastructure of the organisation (Chen, Chiang and Storey, 2012). Therefore, MIS are important for organisations to maintain and improve their profitability and productivity.

By way of illustration, Kabir (2020) conducted an empirical study on BSRM Steels Limited, the largest Bangladeshi steel manufacturer. He analysed secondary data collected from the company's annual reports for 10 years from 2010 to 2019. He revealed that the company's production had increased by 25%, customer sales orders handling capacity had doubled and the average sales had grown by 21% after ERP implementation. He showed that both productivity and profitability of the organisation had been significantly enhanced after ERP implementation. In another study Juraev, Tleumuratov and Akhbaeva (2020) compared the productivity and profitability of 66 oil and gas organisations of which 36 implemented ERP systems and 30 did not. They found that companies using ERP were 9.6% more profitable due to data availability at all stages of production from exploration of the area to production. They also revealed a 4.3% higher productivity coefficient in companies with ERP systems as a result of a continuous production procedures. ERP systems also enabled the organisations to detect fluctuations in demand and act accordingly which improved capacity utilisation by 7.8%. Collectively, these studies outline a critical role for MIS in monitoring the productivity and profitability of organisations which enables them to sustain their competitive advantage.

MIS are used as the core of the information management discipline and are usually considered as the initial systems for managing information-based data. Therefore, the majority of companies and organisations use an MIS because it facilitates the process of gathering sources of information and data (Aydiner *et al.*, 2019). The system used in MIS should be managed appropriately, with proper

maintenance and updating, otherwise it will not provide accurate information. Precise and timely information results in shorter production periods, increased customer satisfaction, and decreased administrative duties (Lipaj and Davidavičienė, 2013). The purpose of an MIS is to extract information and data from relevant sources and derive insights that enhance the growth of a business (Riswandi, 2017). MIS plays a critical role in helping organisations keep their competitive advantage.

In a case study of distribution firms including service and manufacturing by Khan, Asim and Manzoor (2020), found that using an ERP system results in enhanced supply chain management and organisational performance which according to Oghazi *et al.* (2018) decreases costs and provides good connection of distribution systems to improve customer satisfaction. This consequently enables organisations to obtain a good competitive position (Katz, 2017). In the same vein, Jafari and Nai (2018) in their case study of the oil and gas sector in Oman reported that having an ERP system improves operational performance and efficiency, thus giving a competitive advantage to organisations. Barney (1991) defines competitive advantage as a company implementing a value creating strategy not simultaneously being implemented by a large number of other firms. Therefore, when a UK manufacturing firm implements MIS, which is a value creating strategy, it gives them a competitive advantage since many other UK manufacturers do not have MIS or are only at relatively early stages of MIS implementation (The Manufacturer, 2021b). Firms implementing MIS earlier than their competitors can gain access to better distribution channels, build good will with customers and develop a positive reputation in advance of their competitors. Therefore, they may obtain a sustained competitive advantage. To lead the way in implementing such a system, a firm needs to have insights about the opportunities associated with MIS implementation (Barney, 1991). Having this unique business resource (information about benefits of MIS) can allow the firm to implement MIS before others. Halder, Roy and Chakraborty (2010) indicate that the Big Five personality traits are significantly associated with information seeking behaviour of university students. It is plausible then, that personality traits of senior managers might impact their information seeking behaviour which may equip them with insights about MIS opportunities. Therefore, they might implement MIS earlier than their competitors and may enjoy a competitive advantage.

The information and data gathered in MIS can be used by management to make day to day decisions, as it can instantly compare current data against previous records and information. Organisations can benefit from MIS in different aspects including financial, organisational and social. To determine the organisational and social benefits of ERP implementation, Chatti, Radouche and Asfoura (2021) carried out a case study in Saudi Arabian industrial SMEs and ERP solution providers. They demonstrated that user satisfaction, information quality, and better communication are the most important benefits of ERP

systems. In his case study of a large-scale ERP implementation in the Canadian oil and gas industry, Menon (2019) identified the greatest benefits of ERP systems as enhanced key performance indicators (KPI), consistent reporting, access to comparable and visible data, and standardisation of common procedures. He also listed four process improvements which benefitted the company :- enhanced process planning, improved demand planning, improved off-shoring business activities, and improvements in accounts receivable cash procedures. While Menon (2019) was more focused on financial and organisational benefits of ERP systems, Mesíček, Petrus and Stránská (2021) were mainly interested in non-financial implications of ERP systems. In their qualitative study of three manufacturing companies, they found that ERP systems enabled the companies to integrate all information into one database and obtain information that was previously unused which consequently facilitated employees' work due to the availability of this accurate information. UK manufacturers are at relatively early stages of implementing MIS (The Manufacturer, 2021b) and can gain many advantages from MIS.

Management information systems are comprised of five different components: hardware, software, data, procedures, and people. Through the use of MIS there is better communication flow and communication gaps are filled. It also removes communication limitations by supplying appropriate and relevant information at the proper time. This leads to a more frequent and effortless flow of data information across all levels in an organisation (Lim, 2014). Manufacturing organisations need MIS to control their inventory, to anticipate demand and manage distribution, manage their supply chain via real-time communications and collaboration, control their product quality by tracing a complete product history to identify the source of any product issues, etc (The Manufacturer, 2021b). MIS also helps manufacturing organisations improve their efficiency, the resilience of their operations and support for customer growth strategies (The Manufacturer, 2021e). Although MIS is critical for manufacturing organisations, many manufacturing organisations are still at relatively early stages of implementing such technologies (Buer *et al.*, 2020). The UK manufacturing organisations are at relatively early stages of MIS implementation (The Manufacturer, 2019). Some of them already have a MIS, but they need to migrate from their old system to a new one because their old system no longer meets their needs (The Manufacturer, 2021b). According to a major report published by IBM - 67% of manufacturing organisations have pushed forward with their MIS implementation due to the Coronavirus pandemic (The Manufacturer, 2021e). This indicates that the pandemic has made board level senior managers more aware of what MIS can do for their business. No research has been found that examined MIS implementation in UK manufacturing organisations. This could be due to only a recent awareness of the importance of MIS by UK manufacturing organisations. The following section briefly reviews the current state of MIS in UK manufacturing organisations.

MIS in the UK manufacturing context

Manufacturing in the UK, accounts for 15-22% of the economy and 18-27% of employment and is really important for the UK economy. This is because the existence of other services (industrial R&D and service jobs to repair industrial equipment) are largely dependent on the manufacturing industry. Moreover, manufacturing wages are almost 15% higher than the national average and 65% of private sector R&D spending is in the manufacturing sector (Bailey and Rajic, 2020). Therefore, UK manufacturing has a significant impact on the UK economy. According to Department for Digital and Culture (2022), UK manufacturers that use two or more MIS exhibit up to 25% increase in their productivity. Therefore, MIS implementation can have a significant impact on the productivity of UK manufacturers. According to The Manufacturer (2019), there is still a gap between knowledge of UK manufacturing organisation of the benefits of MIS and their investment and implementation. 25% of the respondents of the Annual Manufacturing Report (AMR) survey have no plans to implement MIS and 26% are not sure how to implement it. This indicates that UK manufacturing organisations are at relatively early stages of MIS implementation and there is a need for more awareness in this area. Also, some manufacturing organisations which already have a MIS need to change their current MIS because it no longer meets their needs (The Manufacturer, 2021b). This migration from an old system to a new one can be seen as overwhelming. Furthermore, according to UK Digital Strategy (2022), 'One of the greatest barriers to the adoption of technology by SMEs is understanding what product to choose. 44% of SMEs think that 'there is too much confusing information' about established technology solutions.' Understanding senior managers' decision process could help policy makers to facilitate and stimulate MIS implementation in UK manufacturers. UK government has tried to enhance MIS implementation in UK manufacturing sector by providing financial support such as offering 50% of the cost of an approved MIS, up to a maximum of £5,000 and 1:1 mentoring to small businesses and directing them to courses and webinars related to technologies (Department for Digital Culture Media and Sport, 2022). An extensive search of the literature found no previous study on MIS implementation in the UK manufacturing context.

The importance of MIS

The growing need and use of technology has in one way assisted businesses in achieving a competitive edge, however, with this technology growth, increased failure rates pertaining to the technology adoption are also being observed (Amid, Moalagh and Zare Ravasan, 2012). This is the reason that considerable

attention is being given by researchers to comprehend IS adoption and its associated complexities (Buonanno *et al.*, 2005; Liao, Palvia and Chen, 2009; Brown, Dennis and Venkatesh, 2010; Wu, 2019; Naceur, Cimon and Pellerin, 2021). One of the significant challenges while considering adoption is to consider users' attitude and behaviour towards the adoption (Lam, Cho and Qu, 2007). Zabadi (2016) found that technological and environmental factors along with organisational characteristics are considered important predictors for technology adoption. Adoption and implementation are used interchangeably in the literature. In this study, the term implementation is being used and what is being focused upon in this study is the implementation process. According to Melone (1990, p. 77), 'for the most part, the IS literature is silent on how users form initial attitudes about technologies and how these attitudes are modified over time'. Alkhalifah and D'Ambra (2013) agreed with Melone (1990) and explained that there is a lack of studies in the impact of trust on the adoption of identity management systems. Although some studies investigated the predicting variables of consumer attitudes toward e.g., e-commerce app during the initial adoption phase (McLean *et al.*, 2020); students' initial attitude toward distance learning (Ismaili, 2021); consumers' attitude toward mobile app technology (Vahdat *et al.*, 2021). There is still lack of studies investigating senior managers' attitude toward MIS implementation in the UK manufacturing organisations. This distinction is important because senior managers' attitude toward MIS implementation is of interest in this study not their attitude toward continuing to use MIS. The innovation decision process involves passing through various stages from initial knowledge of an innovation followed by forming a favourable or unfavourable attitude toward it and making the decision to either implement or reject it, to then using the innovation which reinforces the decision made to implement it (Karahanna, Straub and Chervany, 1999). This indicates that the senior managers' attitude toward MIS implementation prior to the implementation process determines whether or not they decide to implement it and allocate the required resources.

Vieru and Rivard (2014) claimed that MIS were designed to track and help managers and employees by transmitting data and information directly to the company manager. This information can then be used by managers to make decisions on different aspects of their organisations including their production rate, quality management, customer growth strategies, etc. (The Manufacturer, 2021b), which will enable their organisation to be productive and profitable and maintain their competitive advantage. Many organisations are not able to operate properly and successfully without the implementation of MIS because MIS allows organisations to view their business processes more clearly and be ready to make necessary changes in a dynamic environment (Malhotra and Temponi, 2010). Introducing MIS helps managers to recognise the strengths and weaknesses of an organisation and aid in improvement of

productivity (Abualoush *et al.*, 2018). Furthermore, implementation of MIS can provide data to managers for informed planning, policy-making and evaluation (Shah, 2014). Better availability of information reduces the risk of uncertainty, improves the quality of decisions being made and helps managers to make more rational choices as they are based on dependable information and data (Lee and Yu, 2012). The process of MIS implementation requires the involvement of technical and managerial skills as the implementers are working as change agents. It is important that implementation is considered as a series of sequential steps that end in the new MIS becoming operational. The key factors that play a dominant role throughout the implementation process are identified as project management, organisational feasibility and IT resources and capabilities (Mora *et al.*, 2017). The studies presented in this section suggest that MIS implementation is complex and requires fundamental organisational changes. The following section will discuss the critical success factors for successful MIS implementation to take place.

Critical success factors for technologies implementation

Although MIS can be beneficial for organisations, the high failure rate is a major concern (Amid, Moalagh and Zare Ravasan, 2012). MIS implementation projects are expensive and time consuming and on average takes 2.5 times longer than predicted, are 178% over budget and delivers 30% of the promised benefit (Zhang *et al.*, 2005). To avoid such costly failures, researchers have identified critical factors that aid successful implementation of technology (Kim, Kumar and Kumar, 2012; Wiengarten *et al.*, 2013; Akgün *et al.*, 2014; Hietschold, Reinhardt and Gurtner, 2014; Ali and Miller, 2017). The literature suggests these critical factors (CSFs) in the implementation of new technology to be, strong view of business goals, dedication of management and staff, policy of internal change management, an effective delivery team, data consistency, comprehensive preparation and training, oriented improvement activities and multi-site problems (Nah and Delgado, 2006; Maguire, Ojiako and Said, 2010; Almajali, Masa'deh and Tarhini, 2016; Ali and Miller, 2017). Although none of the research consider the same sets of factors as being important CSFs, many authors (Somers and Nelson, 2001; Kappelman, McKeeman and Zhang, 2006; Ali and Miller, 2017) include senior management support (SMS) as an important factor.

Some papers create a list of CSFs and others break down the categories concerning these variables (Moon, 2007). In their wide-ranging study, Ngai, Law and Wat (2008) proposed a list of 18 CSFs for Enterprise Resource Planning (ERP) implementation in 10 different countries and regions and also examined the cultural differences. Their work is significant to the field because they determined the most frequently cited CSFs that promote successful implementation as 'top management support' and 'training and education'. Some studies on CSFs for implementing ERP have introduced thorough analyses of sub

factors (Nah, Zuckweiler and Lee-Shang Lau, 2003). There are a few investigations which recognise CSFs identifications and their connection to the ERP life cycle, unlike most examinations that spotlight only on CSF identification (Esteves and Pastor, 2006). In detailed study, Somers and Nelson (2001) proposed a comprehensive list of 22 CSFs through six stages of ERP implementation. This is beneficial because they highlighted the importance of each CSFs at different stages of implementation process (i.e., initiation, adoption, adaptation, acceptance, routinisation, and infusion). It showed that some of the CSFs are only significant in the process for a specific period in time, so this information can be used to allocate the necessary time and resources to monitor the project effectively. They suggested that senior management support (SMS) is one of the most important CSFs in MIS implementation particularly at the initiation stage, which is important because it indicates the critical role of senior managers in commencing implementation. Iacovou and Nakatsu (2008) conducted a Delphi study to investigate risk factors of offshore outsourcing projects with 15 panellists who were senior IT executives and members of the Project Management Institute (PMI). Similarly, Kappelman, McKeeman and Zhang (2006) examined risks associated with IT projects by conducting 138 surveys of experienced IT project managers. Iacovou and Nakatsu (2008) and Kappelman, McKeeman and Zhang (2006) both proposed that the most significant factor in a project's performance is the senior management support. Ali and Miller (2017) also stated that SMS is one of the most essential success factors during implementation. However, their study is limited to large enterprises. A more comprehensive study would include both large enterprises and SMEs. The studies presented thus far provide evidence that SMS is one of the CSFs in MIS implementations, which can reduce the probability of failure. Having established that senior management support is essential for the successful implementation of MIS, the next section will discuss SMS in more details.

Senior management support (SMS)

Top management is the American term for senior management, and they are used interchangeably in the literature. In the present study the term senior management refers to the highest management level of an organisation. In this study, Senior Management Support (SMS) and Top Management Support (TMS) are used interchangeably. While a variety of definitions of the term 'Senior Management Support' has been suggested, this study will use the definition first suggested by Jarvenpaa and Ives (1991) who described it as senior managers' involvement and participation, which refers to how critical they think IT is for their firms' survival and how much time and energy they are willing to invest in IT-related matters, respectively. This suggests that the concept of support not only involves senior managers' actions but is also related to their psychological state and attitude, which demonstrates the underlying mechanism of

senior management support. Young and Jordan (2008) defined SMS as the amount of time dedicated to a programme, such as an Information System programme in proportion to its potential and cost along with integrating the process of management of the business. This definition is limited because it only includes participation but not involvement as mentioned in Jarvenpaa and Ives' (1991) definition of SMS. Excluding senior management involvement, limits the understanding of the underlying reasons that senior managers support an IS project.

Senior management support is particularly important for large, cross-functional IT initiatives for two reasons: firstly, the management can mediate in resolving disputes (Gosain, Lee and Kim, 2005), order, and facilitate the project (Kerr, 2004) which helps the project to move forward. Resolving disputes is important because they might cause delays for the project, which can impact meeting deadlines. Secondly, management can connect with and aid different departments within the business to work together (Ramiller and Pentland, 2009) and change their approaches to align with an organisation's identity and interests (Badrinarayanan, Gupta and Chaker, 2021). Thus, management support influences the success of MIS project. In a detailed qualitative study by Boonstra (2013), the author highlighted the types of behavior that underlie senior management support as, accommodating the implementation project, reshaping organisational context, adapting the IS to the organisation and dealing with stakeholders. The study by Boonstra (2013) contributes to the Upper Echelon Theory field by identifying different behavioral categories of senior management support. This evidence highlights that there are various types of support that a manager can provide for MIS implementation. These elements of support could be undertaken by a senior management project champion or sponsor, other senior managers and CEOs to understand the complicated organisational phenomena surrounding the project (Elbanna, 2013). Senior management support is crucial for the success of the manufacturing industry and manufacturing strategy as it can assist in providing essential resources such as IT, facility, human resources, and capital – be it a service-centric strategy or product-centric strategy (Young and Poon, 2013). Senior management support, if practiced effectively, can improve the IT system, employee engagement, customer focus, and strategic direction of the organisation (Ifinedo, 2008). Moreover, if senior management commits to empowering employees, the organisation is likely to succeed since the effectiveness of the project and strategic control will be improved along with easing the business change process (Dong, Neufeld and Higgins, 2009).

Regardless of outside factors like institutional pressures, it is the senior management team (SMT) that decides to innovate or not (Elbashir, Collier and Sutton, 2011). Therefore, the SMT is thought to be the essential human element that promotes innovation in a business. The literature suggests SMT is the group

of the most powerful officials e.g., Chief Executive Officer (CEO), Chief Operating Officer (COO), and Chief Financial Officer (CFO) that have the firm's overall authority (Hambrick and Mason, 1984; Hambrick, 2007; Krause, Roh and Whitler, 2022; Whitler, Lee and Young, 2022). Similarly, according to Green (1995, p. 223), senior management team consists of the 'CEO and its direct subordinates responsible for corporate policy'. The literature proposes that senior management support ends in fruitful information systems implementation (Liang *et al.*, 2007; Boone *et al.*, 2019). According to the literature (Aloini, Dulmin and Mininno, 2007; Dong, 2008; Iacovou and Nakatsu, 2008; Liu *et al.*, 2009), the most significant element in the accomplishment of a new IS was the assistance of managers. In their quantitative study, Liang *et al.* (Liang *et al.*, 2007) found that senior managers mediate the impact of external institutional pressures on the degree of ERP usage post implementation. Although they considered geographical and cultural diversity in China, they failed to address the types of organisations that they targeted. This would have been beneficial to get insights into the industrial context that they drew their results from. While Liang *et al.* (Liang *et al.*, 2007) focused on post MIS implementation, Dong (2008) was concerned with SMS during implementation. In a qualitative study, Dong (2008) investigated the impact of senior management support during IS implementation in two comparative case studies in two Canadian universities. They found that senior managers need to adjust their level and content of support according to what each situation needs. The study provided useful insights on the impact of senior managers' support during the implementation process on organisational outcomes and indicated that just being supportive is not enough but the support has to match with the needs of the organisation. These findings indicate that senior managers support toward MIS implementation is essential in pre-implementation, during and post implementation process.

Some studies have been interested in the impact of SMS in MIS implementation (Liang *et al.*, 2007; Dong, 2008). Others examined the risk factors which affect MIS implementation. For example, Liu *et al.* (Liu *et al.*, 2009) conducted a Delphi study to investigate the most important risk factors in IS implementation projects in China. Two groups of panellists from a wide range of industries in China consisting of 30 board level senior managers and 34 IT project managers were chosen to identify important IT project risk factors and rank them. Out of 57 risk factors that were generated by both group of panellists in the brainstorming phase, 14 risk factors were chosen as most important. They found that senior managers' support is a critical factor in IS implementation and found that lack of senior management commitment to the project is the most important risk factor. Lack of senior management commitment may create an uncertain environment for the project. It may also limit the financial support and lead to ineffective communication between project managers and other stakeholders (e.g., external consultants and users). The users'

attitude might be greatly impacted by the senior managers' behaviour causing the users to be less cooperative and being less committed to the project. Senior managers manifest their support by being committed to the MIS implementation. A broader perspective has been adopted by Aloini, Dulmin and Mininno (2007) who reviewed the risk factors at different stages of MIS implementation. They also proposed that management support is the most critical risk factor.

Akkermans and Van Helden (2002) examined a case study that ranked senior management support as dominant amongst the essential achievement factors in enterprise resource planning (ERP) implementation. Kim, Lee and Gosain (2005) portrayed senior management as crucial for creating and elevating a vision to shape the IT implementation and ERP frameworks. Similarly, Ke and Wei (2008) claimed that senior management support could encourage a learning climate that is a determinant of ERP execution achievement. This is because senior management support can give authority to project teams that enable them to manage the implementation of the project in all divisions of the business and overcome negative attitudes that have been formed following previous badly implemented projects. These findings indicate that senior managers could facilitate the implementation process through creating a positive environment in their organisations, which facilitates the required organisational changes.

Liang *et al.* (2007) demonstrate the theoretical framework that includes two institutional theory elements and senior management effect. They found that senior management mediates the relationship between institutional forces and organisational behaviour. Institutional theory is particularly important when thinking about the impact of external conditions on the behaviour of an organisation toward innovation implementation. As opposed to the transaction cost approach which was first proposed by Williamson (1981) and theory of resource dependence in the seminal work of Pfeffer and Salancik (1978), the institutional theory states that basic and behavioural changes in associations are mostly because of the need for organisational legitimacy rather than efficiency.

Institutional theory has been broadly utilised as a part of sociology and management literature (Kostova *et al.*, 2020) and has been applied in IS research (Chaubey and Sahoo, 2021). Although institutional theory anticipates isomorphism, organisations are different regarding the degree of MIS implementation under the same conditions (Chaubey and Sahoo, 2021). From a human agency perspective, senior managers translate external impacts into managerial actions such as altering the companies' structure. Senior management play a significant role in implementing IT programmes by combining external and internal knowledge (Mitchell, 2006). Senior managers recognise the benefits of a particular choice of IT product from the improved results other organisations have shown by using it. Therefore, it is logical to suggest

that institutional forces may influence MIS implementation indirectly by influencing senior managers' actions. According to Roger's (2003) innovation theory, an individuals' perception of innovation features impacts their decision to adopt or reject them. That is, a senior manager forms an attitude toward IS that is impacted by IS characteristics (e.g., compatibility, relative advantage, complexity) which then impacts on their decision to implement IS. Therefore, characteristics of MIS has an impact on senior management support. This indicates that IS characteristics and senior managers' support are both important. The studies presented thus far provide evidence that senior manager's support is essential for a successful MIS implementation because not only can senior managers provide the required resources for the implementation process, they also facilitate the process by promoting a positive environment for organisational changes.

Senior management support and IS implementation success

Successful IS implementation has been measured by outcomes such as information quality (Hsu, Yen and Chung, 2015), decision-making satisfaction (Wixom and Watson, 2001), improved decision quality (Matende and Ogao, 2013), improved business performance (Cao and Dowlatshahi, 2005), and system usage (Petter, DeLone and McLean, 2008). Other researchers have studied the impact of senior management support on the application of information systems and computer technology (Ifinedo, 2008; Dong, Neufeld and Higgins, 2009; Lin, 2010). Ragu-Nathan et al.(2004) are of the view that senior management support is a significant determinant in the success of an information system project. Kanwal, Zafar and Bashir (2017) also support this finding and add that the role of senior management support is particularly important in large-scale and complicated IS projects. The authors also state that the support of senior managers in the implementation of IS impacts on planning, evaluation and execution of the project. Senior management support is accepted to be fundamental for implementing IS successfully (García-Granero *et al.*, 2018; Wang, Wang and Wang, 2019; Ali *et al.*, 2021). In the literature Liang *et al.*, 2007; Liu, Wang and Chua, 2015 discuss that management support is vital due to the importance of resources in IS implementation. Management resources are essential to develop IS applications and foundations, as well as to help stakeholders during implementation.

Many studies have analysed the effect of SMS on IS implementation outcomes. It has been discovered that SMS radically influences client innovation convictions (e.g., perceived convenience, perceived helpfulness (Lewis, Agarwal and Sambamurthy, 2003), hierarchical implementation achievement (Wixom and Watson, 2001), dynamic utilisation of IT (Jarvenpaa and Ives, 1991), and adopting IT (Bruque-Cámara,

Vargas-Sánchez and Hernández-Ortiz, 2004). These investigations have differing viewpoints relating to the impact of SMS and consequently conflicting results have been found. For instance, a few investigations expect an immediate and linear connection between SMS and implementation outcomes (Wixom and Watson, 2001; Dong, 2008), a few contend that the connection is mediated by different variables (Sharma and Yetton, 2003; Lee, Shiue and Chen, 2016), while others accept that a more convoluted relationship exists (Basu *et al.*, 2002; Newman, Pan and Pan, 2009). In spite of the fact that the literature has affirmed the significance of SMS (Dong, Neufeld and Higgins, 2009; García-Granero *et al.*, 2018; Wang, Wang and Wang, 2019; Ali *et al.*, 2021), it has been discovered that even with senior management support, an ill-fated project may not be successfully implemented (Baghizadeh, Cecez-Kecmanovic and Schlagwein, 2020). Without understanding the appropriateness of these points of view, the effect of SMS on implementing IS results stays obscure.

To sum up, the literature recognises some of the impacts of senior management support on successful IS implementation. The literature has built up a complex arrangement of connections between management and successful IS implementation. It recognises various factors that conceivably mediate or direct the connection. Conversely, the empirical examination is restricted to demonstrating modelling a successful implementation as a direct function of management support. This restricts the estimation of the hypothesis for the researchers and practitioners. Researchers need precise evidence to assess contending hypothetical models. Practitioners need rules to identify the suitable shape and degree of senior management support under various conditions. The following section moves on to describe in greater detail the different stages of SMS.

Different stages of Senior Management Support

Beliefs and Behaviours

Liang *et al.* (2007) proposed two conceptual stages in the process of senior management support: 1) senior management beliefs (SMB) and 2) senior management participation (SMP). Senior management beliefs suggest the psychological state with respect to the capability of a specific initiative, which is similar to the attitudinal aspect of SMS in Jarvenpaa and Ives' seminal model (1991), while senior management participation refers to the behaviour and activities performed for an initiative implementation (Jarvenpaa and Ives, 1991). Fiske and Taylor (2013, p.525) defined a belief structure as a 'cognitive structure that represents organized knowledge about a given concept or type of stimulus.... It contains both the attributes of the concept and the relationships among the attributes'. Individuals' beliefs enable them to give form and meaning to the information they acquire from the external environment and provides a

basis for inferring the acquired information (Gfrerer *et al.*, 2021). According to Tesser and Leone (1977), an individual may have a large number of beliefs about a particular stimulus and a schema makes only some of those beliefs salient, i.e. a schema provides rules to infer a stimulus. The literature demonstrates that the external environment impacts senior management beliefs, which then influences managerial behaviours (Tejay and Barton, 2013; Ng and Sears, 2020). As indicated by Klein (2017), firms' strategies, choices, and behaviour are driven by the senior managers' psychological image of the desired future state of the firm. Thus, senior management's belief about the advantage of certain technologies, such as cloud computing, may result in certain administrative actions that may raise the level of adoption of these technologies. Senior managers' beliefs shape their attitude toward MIS implementation, and they manifest their favourable attitude by supporting the implementation process.

The outcomes of senior managers having a positive attitude will be that they display 'strong and exciting acceptance' (Sultan and Chan, 2000), involvement ('psychological state of the CEO, reflecting the degree of importance placed on information technology by the chief executive')(Jarvenpaa and Ives, 1991, p. 206), and commitment (Biyalogorsky, Boulding and Staelin, 2006). Behavioural analysis characterises SMS as a system of relevant managerial activities e.g., providing technical assistance in resolving programme and hardware problems (Chu *et al.*, 2017), taking part in 'exercises or practical individual interventions' (Jarvenpaa and Ives, 1991), taking part in 'project support' (Wixom and Watson, 2001) and 'facilitating ERP testing' (Liang *et al.*, 2007).

Past studies provided evidence of the two-stage involvement of senior management in the implementation of web technologies (Lefebvre, Mason and Lefebvre, 1997), enterprise (Liang *et al.*, 2007), and business intelligence systems (Lee *et al.*, 2014). Lefebvre, Mason and Lefebvre (1997) also suggest that investment in organisational IT administration exercises is generally determined by senior management beliefs rather than objective reality, which supports the two-stage model of TMT support. These views represent two different philosophical viewpoints on the positions that are played by senior managers. The attitudinal understanding of TMS follows the 'back-seat driver' perspective (Jarvenpaa and Ives, 1991) in which senior management are supposed to follow a hands-off approach and an emphasis on building a welcoming environment. Behavioural analysis follows the perspective of 'involved partners' (Jarvenpaa and Ives, 1991) in which senior managers are encouraged to have a clear effect on the change of technology and partnership (Leonard-Barton and Deschamps, 1988). The competing points of view of TMS have contributed to opposing assessments.

There is a disparity between behavioural support interventions and their concept of benefit. For example, Guimaraes and Igarria (1997, p. 859) defined management support to include 'upper management

motivation and resource distribution', representing the relational view of TMS. Additionally, they included attitudinal elements (e.g., 'business awareness' and 'management interest'). While the studies on SMS have made an array of useful observations, they have not yet established a consistent or conclusive interpretation of TMS, and the complicated and contradictory meanings and measurements have resulted in contrasting empirical results. For example, Leonard-Barton and Deschamps (1988) failed to find a clear correlation between perceived management activities and the usage of the LAYOUT (software package) framework; Thong, Yap and Raman (1996) found an inconsequential relation between TMS and client satisfaction. Thong, Yap and Raman's (1996) study may not be generalisable to businesses in countries with very different cultural contexts since the study was conducted on small businesses in Singapore. Compeau and Higgins (1995) found that organisations support has a negative impact on self-efficacy. In their study, they used a hypothetical scenario to measure self-efficacy of respondents which may have limitations because the respondents may not be capable of imagining their response in comparison to an actual situation.

Bounded rationality and managerial decision making

Early studies on how humans make decisions date back to 1940s. A book called 'The Theory of Games and Economic Behaviour' illustrates decision making purely based on mathematical models (Von Neumann, J. Morgenstern, 1945). Rational decision-making models, descriptive models, and naturalistic decision making are three phases of decision-making theory development (Polič, 2009). Rational decision theory is a normative prescriptive theory that prescribes how decisions should be made to be rational (Klein *et al.*, 1993). The theory emerged from 1955 to 1975 in which decision problems were separated into choices, uncertainties and outcomes. However, this theory does not fully explain decisions made under stress which abstract rationality as humans are not like computers (Polič, 2009). Descriptive theory also called behavioural decision theory prevailed between 1965 and 1985 from Herbert's Simon's concept of bounded rationality (Hansson, 1994). According to the seminal work of Simon (1955), people usually use a satisficing rather than an optimising strategy, due to situational and organisational limitations. These limitations are typically imposed by a person's perception of the problem which restricts rational decision-making by human cognitive ability. Bounded rationality is commonly associated with 'cognitive constraint' (brain limitation as a decision making machine) which is due to information overload (Taylor, 1975).

Up to the 1980s, decision-making studies only focussed on a decision event rather than focusing on when a decision maker overviews the choices, weighs possible outcomes of each choice and then selects one based on his goals and values. The main weakness of classical decision-making theories is that they lack

adequate description of the situation (Polič, 2009). However, naturalistic decision making (NDM) studies show how individuals make decisions based on their experience in real world settings (Zsombok and Klein, 1997). NDM was first introduced at a conference in Dayton, Ohio in 1989. The majority of previous decision making models described how rational decisions should be made, while NDM illustrates how decisions are actually made by experts such as fire fighters and military leaders in complex and often dangerous situations under time pressure (Schraagen, Klein and Hoffman, 2008). According to NDM, individuals use different decision making strategies based on the situation, their experience and the task and they are boundedly rational (March and Simon, 1958). NDM assumes that decision makers generate sequences of options and evaluate them based on pattern matching, situation awareness and story construction (Cohen, Freeman and Wolf, 1996). According to NDM, decision makers select a good enough but not necessarily the best option due to organisational constraints. This is because many paths will lead to a satisfactory goal (Lipshitz, Klein and Carroll, 2006). NDM takes place in organisational settings more often as organisational goals and values are not the personal preference of the individuals. Organisations might have guidelines and standard operating procedures, therefore decision makers balance their personal choice with the norms and goals of their organisation (Klein *et al.*, 1993). Nevertheless, NDM has not been used broadly in for-profit organisations since it first emerged to study military and paramilitary organisations (Lipshitz, Klein and Carroll, 2006).

In their empirical study, Gounaris and Koritos (2012) compared adopters of internet banking (IB) and non-adopters in Greek retail banking using the theory of bounded rationality as the underlying theoretical framework. They found that individuals who were exposed to IB before, were able to relate specific innovation attributes to its potential benefit since they had a less ambiguous perception of how the attributes translate into benefits. Non-adopters who did not have any direct experience with IB needed a greater amount of information to relate innovation attributes to potential benefits since they lacked familiarity with IB. Furthermore, nonadopters' need for information increased due to the intangibility of IB which makes a nonadopter subject to cognitive constraint. This caused them to combine IB attributes into more abstract constructs. The authors suggest that technologically based innovations have significant impact on the drivers of the adoption decision and the way variables should be structured to explain the decision.

As previously stated, in the UK, 25% of the respondents of the Annual Manufacturing Report (AMR) survey had no plans to implement MIS and 26% are not sure how to implement it. However, there are some UK manufacturing organisations which already have a MIS and need to change their current MIS because it no longer meets their needs (The Manufacturer, 2021b). These figures suggest that some of the UK

manufacturers are nonadopters and they need more information about MIS to translate its attributes to potential benefits which indicates that they are subject to cognitive constraint. Although adopters of MIS might have a less ambiguous perception of how the attributes of a new MIS translates into protentional benefits, they might be subjected to cognitive constraint due to the complexity and high risks associated with implementation. Many organisations face failure implementing ERP, and many others are afraid of implementation due to the expenses and lack of reliable information on the advantages and disadvantages of implementation (Ali and Miller, 2017). This suggests that implementing MIS involves high levels of uncertainty which may cause senior managers difficulty in assessing the real risk levels and expected outcomes of MIS implementation. This in turn raises the issue of cognitive constraint (Taylor, 1975), under which senior managers may use a limited rationality when acquiring and processing all the relevant information. UK manufacturers being mostly SMEs (Department for Business Innovation and Skills, 2020) may have limited access to financial resources. This could make the implementation decision making process more difficult for senior managers since MIS implementation is challenging and costly in terms of money and time which in turn increases the pressure on the senior manager from the risk of failure (Chatti, Radouche and Asfoura, 2021). Therefore, MIS implementation, due to the complexity and high risk associated with it, requires purely logical decisions to be made. However, due to cognitive constraint senior managers use at a best boundedly rational approach to select the most reasonable option rather than the best one.

Dynamic conditions in organisations may influence intuition in decision making (Kahneman, 2011). According to Klein (2003), intuition is when an individual applies their past experience in current decision making. Holyoak and Simon (1999) infer that people see information that supports their view and often discard information that challenges their opinion. That is, humans validate information that confirms their assumptions and assess their perception of reality which then instructs the outcome of their decisions (Pittenger *et al.*, 2022). Clarke and Mackaness (2001) investigated whether intuition is a core decision-making element by using qualitative in-depth case studies to construct cognitive maps of the decision schema of three senior managers from a major UK electrical retailer who were responsible for making strategic decisions related to investment in new superstores. They found that senior managers use simpler cognitive explanations and a high proportion of non-factual information. They also maintain that senior managers use their experiences to 'cut through' to the heart of a situation which helps them to make sense of the situation and test its validity. Senior managers use their intuition more in strategic decision making which might be due to the demands of their positions. The evidence presented here suggests that senior managers' past experience in implementing MIS may impact their decision to implement MIS. For

example, in the case of a UK manufacturer who already has a MIS system, if the manager has perceived the implementation to be a failure (i.e. not achieving organisational goals and finishing on time within approved budget (Amid, Moalagh and Zare Ravasan, 2012)), this might have a negative impact on their decision to implement a new system in their organisation.

Hambrick (2007) recognised the 'cognitive base' and 'values' of managers as major psychological attributes influencing their strategic decision making. Cognitive base suggests beliefs about components that officials consider to be strategically important and beliefs about the causal connections between these elements and performance of the organisation (Finkelstein, Hambrick and Cannella, 2009; De Cock, Andries and Clarysse, 2021). These beliefs show explicit and implicit mental models that form causal inferences, for example, 'if X, then Y.' Following past work, beliefs related to a cognitive structure are labelled as a senior managers' 'cause-effect beliefs' (Arthur, Herdman and Yang, 2016).

What a leader knows (through experience or training) is anticipated to influence what information he/she notices and how he/she interprets that data (Hambrick, 2007; Wang *et al.*, 2016; Lyngsie and Foss, 2017; Evert *et al.*, 2018). For instance, a manager with engineering experience and education is more likely to search out and notice data related to a products' technical specifications and assess the significance of that information in contrast to somebody with a marketing background (Hambrick, 2007). Likewise, Datta and Iskandar-Datta (2014) assert that managers' experiences shape their values, beliefs and cognitions which then markedly influences their decision making and behaviour.

Hambrick (2007) proposed that a manager's beliefs will affect their perception and understanding of data that they acquire. Values are known as usually consistent aspects of a managers' attitude, generated to some degree by practise and not always subject to adjustment (Rokeach, 1973; Dalvi-Esfahani, Ramayah and Rahman, 2017). The principles and cause-effect convictions of managers are likely to have an impact on strategic decision-making (Robert Mitchell, Shepherd and Sharfman, 2011). For the definition of management principles, researchers have largely followed Rokeach's (1973, p. 5) definition of it being a 'permanent conviction that a certain mode of conduct or end-of -life is individually or socially superior to the same or contrary mode of conduct or end-state of existence '. Principles are underpinned by a number of values that drive managers to act in ways that they consider to be socially acceptable or beneficial (Rokeach, 1973; Schwartz, 1992, 2012; Hitlin and Piliavin, 2004).

As stated by Sarason, Pierce and Sarason (2014), most people vary in the kinds of cognitive interference they experience. Differences in emotions and attitudes often create more general constructs of positive affect versus negative affect. The concept of managerial cognitive capability demonstrates the ability and capacity of individual managers to perform mental activities. In strategic management the term capability

refers to the capacity to perform a duty or a function in a generally significant manner. Practice and training can enhance managers' capabilities of attention (Helfat and Peteraf, 2015). These findings indicate that senior managers' perception of any information differs based on their experience. This section has analysed two stages of senior managers' support and has suggested that senior managers' decision to support MIS implementation is rooted in their beliefs, values and cognitive capabilities, which shape their attitude toward MIS implementation. The following section will discuss the contributing factors of senior managers' attitude toward MIS implementation.

The contributing factors of senior managers' attitude

As indicated previously, senior managers support MIS implementation due to their favourable attitude toward MIS. Attitude can be described as a person's disposition to react well or badly to an individual, an item, an organisation or an event, or to the way that an individual appraises a behaviour (Ajzen and Fishbein, 1977). Before proceeding to examine the predictors of senior managers' attitude toward MIS implementation, it is important to discuss Upper Echelon Theory (UET) as it is one of the most influential theories in the upper echelon field of research which was first introduced by Hambrick and Mason (1984).

Upper Echelon Theory

The basic logic of the Upper Echelon Theory (UET) is that senior managers make their organisational strategic choices based on their experiences, values, and personality traits (Hambrick, 2007) and these choices impact a firm's performance (Hambrick and Mason, 1984). According to Hambrick and Mason (1984), organisational outcomes (i.e. organisational strategic choices) can be predicted partially by characteristics of senior managers based on the view that senior managers' choices are impacted by their cognitive base and values. Since senior managers' cognitive base and values are difficult to observe, Hambrick and Mason (1984) suggest that senior managers' observable characteristics (i.e. age, functional tracks, other career experiences, education, socioeconomic roots, financial position, group characteristics) can be used as a replacement of their cognitive base and values. According to UET, managerial characteristics also impact organisational performance, either directly or mediated by organisational outcomes. Hambrick (2007) later suggested executive job demands as a moderator of the relationship between senior managers' characteristics and organisational outcome. Executive job demands refers to the level of job demands (i.e. 'task challenges', 'performance challenges', and 'executive aspiration') a senior manager faces. Hambrick (2007) maintains that a senior manager with a high level of job demands will have less time to consider decisions and will rely on their personal experiences. This is similar to 'cognitive constraint' (Taylor, 1975) and bounded rationality that was

discussed earlier. When a senior manager is subject to a cognitive constraint, the relationship between their characteristics and organisational outcomes will be stronger. For a senior manager with a lower level of job demands, their decision-making will be more comprehensive and they will rely less on their personal characteristics (Hambrick, 2007). This theory focuses on the organisations' strategic decisions and their performances while also including, however, not limited to strategic renewal, internationalisation, acquisitions, and mergers (Hiebl, 2014). MIS implementation can be considered as a strategic choice, which is defined as being an action which is 'complex and of major significance to the organisation' (Hambrick and Mason, 1984, p.194), because MIS implementation is complex and often involves fundamental organisational changes (Amid, Moalagh and Zare Ravasan, 2012). As discussed in a previous section, senior managers in UK manufacturing might be subjected to cognitive constraint when making decisions to implement a new MIS in their organisations due to the complexity and high risks associated with MIS implementation. According to UET, under high level of job demands, senior managers' characteristics will have a stronger impact on senior managers' strategic decision-making. As such, UET seems well suited to study senior managers' decision to implement MIS in their organisations.

Lee, Sun and Moon (2018) applied UET and validated it by investigating CEOs' observable characteristics (i.e. age, tenure, and formal education) on corporate social responsibility (CSR) (i.e. business CSR information related to community, employees, diversity, the environment, and products) in the US restaurant industry. CSR is defined as a business model or action that follows ethical standards and social norms (Chapple and Moon, 2005). CSR is an organisational strategy used to gain competitive advantage through forming a positive reputation for organisations which eventually contributes to companies' growth (McWilliams and Siegel, 2011). Lee, Sun and Moon (2018) used the number of employees in a restaurant as a moderator between CEOs' characteristics and CSR activities since larger firms have more stakeholders who will impact a firms' strategic decisions. They found that age has a negative impact on CSR activities since older CEOs have limited mental stamina for executing strategic decisions. Tenure had a positive influence on CSR since longer-tenured CEOs are more likely to implement CSR for their reputation and career stability. More educated CEOs were found to implement less CSR which might be due to their confidence in their knowledge from their higher formal education, which makes them more comfortable to engage in organisational plans that create business profits rather than making an effort to promote stakeholders' benefits. These findings could help organisations to select appropriate CEOs based on their CSR approach. For instance, if an organisation intends to implement more CSR activities, it is more suitable to consider younger, longer tenured and less educated CEOs. Applying UET to investigate the impact of senior managers' characteristics on their strategic decisions to implement MIS in the UK

organisations will be beneficial for UK manufactures as the findings of this study could be used to select or assign an appropriate senior manager to implement MIS in their organisation which will then help them to gain or sustain their competitive advantage.

Abatecola and Cristofaro (2018) maintained that UET indicates that organisational performance and strategic outcomes are partially predicted by managerial background characteristics i.e., the managers' values and cognitive basis for the managers' values. Besar, Ali and Ghani (2017) agreed and added that the three basic principles that underlie UET includes cognitive bias and values which are the reflection of the strategic decisions; knowledge and values which relate to particular observable characteristics such as experience or training and the outcomes related to the observable characteristics of the senior managers. These studies highlight that senior managers' characteristics impact their attitude through their values and perceptions. Finkelstein, Hambrick and Cannella (2009) highlighted that there are two main factors that a manager faces which impact on his attitude towards implementation. The first factor is the level of experiences and knowledge e.g., the more knowledge and experience a senior manager has, the more likely he is to take the decision to enhance the MIS. The second factor is the degree of risk e.g., if a manager finds particular changes threatening, they might disrupt the process (Finkelstein, Hambrick and Cannella, 2009). According to Evert et al. (2018), there are different factors, on the basis of which, a senior manager's attitude varies which are their age and number of projects that the manager has experienced. In a study by Sobol and Klein (2009), the relationship between the background of chief information officer (CIO) and financial performance of a firm was examined. They claimed that a CIO with IT background makes more profits than a general manager. Senior managers' influence on organizations' strategic decisions may vary based on their various characteristics (Lin, Ku and Huang, 2014). The variations in characteristics of a person which can be evaluated for their effect on strategic decision making may include demographics, personality and mental ability (DuBrin, 2013). Taken together, these studies support the notion that senior managers' characteristics are predictors of their attitude which impacts on their support of MIS implementation.

The Upper Echelon Theory notes that organisational performance – both policy and productivity – represent the principles and cognitive structures of senior managers. More precisely, research indicates that the experience of senior management in their organisational environments influences strategic decisions that inevitably influence the company's efficiency (Oppong, 2014). To test this hypothesis, researchers have addressed how senior managers control their organisations in two ways. Firstly, they analyse the demographics of senior management and link them to the success assessments of the enterprise. Secondly, the underlying psychological characteristics of senior management are measured to

see whether or not they relate to organisational performance. However, most UET analysis has taken the 'demographic' method instead of the 'psychological' method with a few empirical studies comparing numerical and psychographic variables. It can be argued, based on initial and amended versions of the theory, that personal characteristics of senior management can affect the organisational outcomes directly.

Researchers have looked at UET in different countries and industries. For example, organisations in the computer, chemical, and natural gas distribution industries (Finkelstein and Hambrick, 1990); Private Chinese manufacturing firms between 2000-2002 (Loukil, Yousfi and Cheikh, 2020); Employees and managers of SMEs in Vietnam (Le *et al.*, 2020); Malaysian public firms (Besar, Ali and Ghani, 2017); Low and high technology US firms (Balkin, Markman and Gomez-Mejia, 2000); firms listed in Business week 1,000 lists from 1989-1990 (Barker and Mueller, 2002); the professional and management personnel at the University of South Australia (Quazi and Talukder, 2011); Funds raised in the United States (Zarutskie, 2010); SMEs across different industries in the Netherlands between 1980 and 1998 (Alexiev *et al.*, 2010). However, an extensive search in the literature found no previous study applying UET in the UK manufacturing industry. Therefore, this study gives an insight into senior managers' behaviour in the UK manufacturing context.

Extensive research has been carried out over the last 40 years on senior managers. Researchers (Hambrick and Mason, 1984; Hambrick, 2007; Finkelstein, Hambrick and Cannella, 2009; Wang *et al.*, 2016) have over many years attempted to understand how senior managers' characteristics influence their strategic choices. Finkelstein, Hambrick and Cannella (2009) indicated that senior managers' characteristics (i.e., tenure, experience, education and personality) form their values and beliefs, which influence their decision making and behaviours. The detailed study by Wang *et al.* (2016) investigated the role of senior managers in firm performance based on UET and found that senior managers' characteristics such as formal education, career experience and positive self-image have a significant impact on their strategic actions, which consequently may impact senior managers' actions toward MIS implementation. This suggests that senior managers' decision-making is influenced by their personality traits and because personality traits impact their perception of available strategic actions this will affect how senior managers allocate essential resources for a successful MIS implementation.

In a study by Barker and Mueller (2002) the impact of CEO's demographic factors, including age, gender, education, and tenure on organisations' research and development (R&D) expenses were investigated. They found that age and tenure have a negative impact on R&D spending. Older CEOs

follow lower-growth strategies (Child, 1974) and are more risk averse which has a negative impact on R&D spending. Longer-tenured CEOs have less interest in investing in organisational changes such as spending in R&D and prefer instead to focus on efficiency and stability. CEO's career experience in marketing and/or engineering/R&D positively impacts R&D spending. This is because these business functions emphasise growth through exploring new markets and products (Hambrick and Mason, 1984) CEO's formal education has no significant impact on R&D spending once a CEO has attained a college degree, however CEO's with advance science-related degree has significant impact on R&D. Barker and Mueller (2002) also suggest that CEOs' personality traits shape their strategic decisions and argue that the impact of personality increases as tenure increases since their power grows with tenure. Li *et al.* (2006) studied the relationship between chief information officer (CIO) characteristics and innovative use of IT by focusing on CIO demographic variables and personality traits. The authors found that CIO's 'evolving' characteristics including age and tenure do not impact on a firm's innovation. They also showed that CIO Openness and extraversion, which are 'permanent' characteristics, have a positive effect on the level of a firm's innovative behaviour towards IT usage. These studies suggest that senior managers' characteristics (demographic and personality traits) have an impact on their decisions and attitude.

Although there is broad agreement that CEO experience impacts the firm (Hambrick, 2007), there has been no comprehensive quantitative study that examines the relationship between senior managers' characteristics and their attitude. For example, Wang *et al.* (2016) used meta-analytical techniques to investigate the impact of CEO characteristics (age, tenure, education, career experience, psychological attributes) on a firm's strategic actions and a firm's performance. The study gives a good indication of the predictors of a firm's strategic actions, but did not examine the relationship between prior involvement of senior managers in IS projects and their strategic actions. In demographic-based analyses, correlations between the characteristics of the senior management team and organisational outcomes were shown and often predicted, but some studies (e.g., López-Muñoz and Escribá-Esteve (2017) did not empirically investigate the impact of senior management team's characteristics on organisational outcomes.

In another study by Quazi and Talukder (2011), the relationship between demographic characteristics (age, education level, training status) of users and innovation acceptance is investigated, but prior experience and prior involvement in other innovations were not considered. User involvement and systems success and project performance have been studied in previous studies (e.g., Harris and Weistroffer (2009)). However, no previous study has examined the influence of senior managers' prior involvement in IS projects and their attitude toward IS implementation. The relationship between education and attitude has been studied before (e.g., Barker and Mueller(2002); Barzekar and Karami

(2014); Ahn, Minshall and Mortara (2017)), but there would appear to be only a few studies (Barker and Mueller, 2002; Zarutskie, 2010; Lin *et al.*, 2011) investigating the difference between different levels of education and positive attitude. This study investigates this relationship to give new insight into how a higher level of education can impact a senior manager's attitude toward MIS implementation.

UET is significant because it identifies the underlying reasons for the way organisations act in terms of their strategic choices and efficiencies, which then provides a better understanding of the factors which effect an organisation performance and their strategic actions. This understanding enables organisations to improve their performance and consequently maintain their profitability. UET has been used to study firms' strategic actions and performance (e.g., Wang *et al.*, 2016). López-Muñoz and Escribá-Esteve (2017) state that the upper echelon theory suggests that organisational objectives and outcomes are a critical reflection of the organisations' senior managers' characteristics. This is because organisational objectives are mainly decided by senior managers. Senior managers make decisions based on their characteristics including attitudes, demographics, values, beliefs, functional experiences, professional competencies and educational background (Hambrick, 2007).

Previous studies have investigated the impact of demographic factors, e.g., in their influential study, Hambrick and Mason (1984) looked at CEO's background and demographic variables including age, formal education, socioeconomic background, and functional track. They showed that senior managers' age and tenure is negatively related to their risk-taking, while their functional experience and education is positively related to their firms' growth and innovation, respectively. Barker and Mueller (2002) investigated the impact of demographic factors including age, gender, education and tenure on an organisations' research and development expenditure. Their study is innovative because they treated education as a categorical variable by using dummy variables to analyse education unlike the broadly used method of analysing education as a scale variable. Treating education as a categorical variable enables to explore the impact of different levels of education on organisations' research and development expenditure. If education is treated as a scale variable, the results did not show any significant impact.

This is important because they found that education has a significant impact on research and development (R&D) spending up to college degree and after that level higher education has no significant impact. They also found that age is negatively related to R&D spending, while experience and tenure have a positive impact on R&D spending. The main weakness of their study is the failure to include the location and type of industry in their sample. This is important because it would have helped in understanding the organisational and cultural context of their research. Li *et al.* (2006) studied the relationship between CIO

characteristics and innovative use of IT via focusing on CIO demographic variables and personality traits in Singapore technological organisations. Their study is thorough because they investigated the impact of personality traits, which highlighted the importance of senior managers' personality traits on their decision making. The authors found that CIO's 'evolving' characteristics including age and tenure do not impact on a firm's innovation. They also show that CIO Openness and Extraversion, which are 'permanent' features, have a positive effect on the level of a firm's innovative behaviour towards IT usage. Certain demographic characteristics cannot be controlled by firms, for example, although gender is an important variable for championing behaviour, replacing a senior manager due to his or her gender is not legal. Thus, studying personality influences on innovation strategies has been more important (Li *et al.*, 2006). The discrepancy regarding the impact of age and tenure that was mentioned above could be attributed to the different contexts that the studies were conducted under. In a recent study, Wang *et al.* (2016) found that CEO's demographic characteristics which include previous experience, education, and also positive self-image have a positive influence on an organisation's strategic actions. However, the authors conclude that CEO tenure has a negative impact on a firm's strategic actions. These findings indicate that senior managers' attitude is not only impacted by their demographic characteristics, but also by their positive self-image. So far very little attention has been paid to factors affecting senior managers' attitude toward MIS implementation in the UK manufacturing context. This research will focus on senior managers' characteristics (i.e., age, career variety, tenure, education, prior involvement in IS projects and personality traits) and how they impact senior managers' attitude toward MIS implementation.

In demographic-based analyses, correlations between the characteristics of the top management team and organisational results were conclusive, but the analyses failed to explain the relationships. This means that some demographic studies have succeeded in producing causal explanations instead of cause-related explanations of the processes by which demographics influence organisational performance. The research has increasingly developed a 'black box of organisational dynamics,' which emerges from causal analytical analyses that investigate correlations between the top management characteristics and corporate success, without seeking to define the intervention processes underlying corporate performance (Oppong, 2014). It was proposed to research influences where the demographics are perceived to constitute a surrogate, outside the current demographic concern. The author proposed that researchers concentrate on assessment, psychographics and the transfer of influence within the top management teams (Oppong, 2014). Table 2 presents the studies which examined senior managers' characteristics.

Table 2: Studies examining senior managers' characteristics (i. e., age, career experience, education, gender, sex, tenure)

Authors	Sample size	Sample characteristics	Methodology	Findings
Barker and Mueller (2002)	172	Firms listed in Business week 1,000 lists from 1989-1990	Empirical	<ul style="list-style-type: none"> • CEO's <i>age</i> is negatively related to R&D spending • <i>Career experience</i> in marketing and/or engineering/R&D positively impacts R&D spending • CEO's <i>formal education</i> has no significant impact on R&D spending once a CEO has attained a college degree, however CEO's with advance science-related degree has a significant impact on R&D • <i>Long-tenured</i> CEOs have positive impact on R&D spending
Quazi and Talukder (2011)	275	The professional and management personnel at the University of South Australia	Empirical	<ul style="list-style-type: none"> • Employees' positive attitude positively impacts technological innovation adoption • Training is a predictor of both perception and usage of innovation

Authors	Sample size	Sample characteristics	Methodology	Findings
				<ul style="list-style-type: none"> • Education level of employees has a positive impact on their favourable attitude towards an innovation • Age doesn't have a significant impact on employees' attitude
Harris and Weistroffer (2009)	28	Empirical research studies published from 1996 to 2009 examining the significance of user involvement	Conceptual	<ul style="list-style-type: none"> • User involvement influences system success
Zarutskie (2010)	318 first-time venture capital funds	Funds raised in the United States Between 1980 and 1998	Empirical	<ul style="list-style-type: none"> • Managers with prior experience as venture capitalists and managers with past experience at start-up companies manage funds better • Managers with more industry-specific human capital in strategy and management consulting manage funds better
Alexiev <i>et al.</i> (2010)	705	SMEs across different industries in the Netherlands	Empirical	<ul style="list-style-type: none"> • Top management team heterogeneity (expertise, background, experience, education, and complementary skills) moderates the influence of advice seeking on exploratory innovation

Authors	Sample size	Sample characteristics	Methodology	Findings
Nielsen (2009)	60	Journals published between 1984-2005	Conceptual	<ul style="list-style-type: none"> • Lack of clarity about analysis level both theoretically and empirically in the field of TMT heterogeneity studies
Serfling (2014)	20,973 firm-years	2356 unique firms and 4493 unique CEOs	Empirical	<ul style="list-style-type: none"> • CEO's age is negatively related to R&D investment • CEO's age is negatively related to risk-taking behaviour. • CEO's age is negatively related to stock return volatility
Barzekar and Karami (2014)	89 middle managers	Teaching hospitals in Iran in the second half of 2012	Empirical	<ul style="list-style-type: none"> • Sex has significant impact on computer usage. • Age and education have no significant impact on computer usage • There is a significant relationship between organization resource, knowledge, process, management, value and goals with IT implementation
Mitra and Mishra (2016)	unknown	Articles referring to people/behavioural aspects of ERP implementation between 1999-2015	Conceptual	<ul style="list-style-type: none"> • Identified critical behavioural factors influencing ERP implementation

Authors	Sample size	Sample characteristics	Methodology	Findings
Simsek (2007)	402	SMEs privately owned companies over a two-year-old period	Empirical	<ul style="list-style-type: none"> • CEO-level determinants (collectivistic orientation) and CEO tenure has a significant positive impact on behavioural integration • In terms of TMT diversity, goal preference and education were negatively related to behavioural integration • Firms' size was negatively related to behavioural integration. • Firm's performance was positively related to behavioural integration
Zhu, Hu and Shen (2020)	697	New CEOs of the firms listed in the S&P 1500 index in 2001	Empirical	<ul style="list-style-type: none"> • New insider CEO's prior board experience is negatively related to strategic change, however, their prior board experience at other firms has a positive impact
Crossland <i>et al.</i> (2014)	250	CEOs	Empirical longitudinal	<ul style="list-style-type: none"> • CEO career variety has a positive impact on firm-level strategic novelty
Ahn, Minshall and Mortara (2017)	329	CEOs from Korean SMEs in Second quarter of 2013	Empirical	<ul style="list-style-type: none"> • CEOs' positive attitude, entrepreneurial orientation (EO), patience and education have positive impact on open innovation in SMEs • CEO education and working years have significant impact on open innovation

Authors	Sample size	Sample characteristics	Methodology	Findings
Díaz-Fernández, González-Rodríguez and Simonetti (2020)	179	multinational high-technology TMTs.	Empirical	<ul style="list-style-type: none"> • TMT diversity has a positive impact on firm performance
Kim (2018)	203	Public employees in local government in south Korea	Empirical	<ul style="list-style-type: none"> • Relative organizational tenure is negatively related to both organizational citizenship behaviour (OCB) and turnover intention but no significant effects on public service motivation (PSM) and burnout • Relative organizational tenure is negatively related to the OCB of subordinates but not leaders
Loonam <i>et al.</i> (2014)	Unknown	Literature review	Conceptual	<ul style="list-style-type: none"> • Suggest a series of steps for top managers when supporting IS
Jarvenpaa and Ives (1991)	57	CEOs of firms selected from Fortune 500	Empirical	<ul style="list-style-type: none"> • Executive involvement has a positive impact on firm's progressive use of IT • CEO's participation, prevailing organizational conditions, and CEO's functional background are predictors of executive involvement
Bergh (2001)	124	Large acquisitions between 1986-1992 from the journal of Mergers & Acquisitions	Empirical	<ul style="list-style-type: none"> • Organizational tenure of retained acquired firm senior manager has a positive impact on retention of the acquired company • The longer tenured senior managers are the more valuable to keep

Authors	Sample size	Sample characteristics	Methodology	Findings
Hambrick and Mason (1984)	N/A	Theory building	Conceptual	<ul style="list-style-type: none"> • Organizational outcomes (strategic choices and firm performance) are partially predicted by managers' characteristics • Managers' age is negatively related to their risk-taking • Functional experience is positively related to firm growth • Managers' tenure is negatively related to strategic choices • Level of education is positively related to innovation • Homogenous TMT make strategic choices more quickly
Finkelstein and Hambrick (1990)	100	Organizations in the computer, chemical, and natural-gas distribution industries	empirical	<ul style="list-style-type: none"> • Management team tenure have significant impact on firm's strategy and performance • Tenure is negatively related to strategic experimentation and change • Short-tenure teams are related to performance levels that deviate-being either much higher or lower-from industry tendencies

Authors	Sample size	Sample characteristics	Methodology	Findings
				<ul style="list-style-type: none"> • Managerial discretion moderates the relationship between managers characteristics and organizational outcomes
Hermano and Martín-Cruz (2016)	62	CEOs and project managers of firms from all industries all over the world	Empirical	<ul style="list-style-type: none"> • Operational and dynamic capability building mediate the relationship between top managers and project, portfolio, and firm performance • Top management involvement is positively related to project performance
Lin, Ku and Huang (2014)	244	Largest manufactures listed in Common Wealth magazine (2009) and machinery manufacturers listed in the Taiwan Association of Machinery Industry Directory	Empirical	<ul style="list-style-type: none"> • Trust and social interaction positively impact Export market orientation (EMO), which then enhances export performance • Moderating effect of degree of internationalization has no significant impact on the EMO and export performance relationship
Lin <i>et al.</i> (2011)	1088	Private Chinese manufacturing firms between 2000-2002	Empirical	<ul style="list-style-type: none"> • CEO incentive schemes has a positive influence on both firm innovation effort and performance • CEO education, professional background, and political connection have positive impact on firms' innovation effort

Authors	Sample size	Sample characteristics	Methodology	Findings
Pankratz and Basten (2018)		Interviews with experienced IS project managers	Exploratory cross-sectional	<ul style="list-style-type: none"> • Management attention and commitment contribute to project-related motivation • Senior managers' experience in delivery and the ability to solve conflicts and motivate the team is related to motivation
Datta and Iskandar-Datta (2014)	1598	CFOs	Empirical	<ul style="list-style-type: none"> • 'strategic' CFOs with an elite MBA (generalist) consistently control a total compensation premium • CFOs' education background and their elite professional networks influence their compensation command
Iskandar (2015)	unknown	Deductive analysis	Conceptual	<ul style="list-style-type: none"> • Management commitment impacts accounting information system quality
Damodaran (1996)	unknown	Practical guides for user involvement process	Conceptual	<ul style="list-style-type: none"> • Top and middle managers have a role of supporting user involvement in IT projects
Palanisamy (2001)	296	IS users from 42 Indian organizations	Empirical	<ul style="list-style-type: none"> • User involvement in IS planning impacts IS enablement for organizational change and IS enablement for organizational learning • User involvement in one stage of IS planning impacts participation level in the next stage

Authors	Sample size	Sample characteristics	Methodology	Findings
Pries-Heje (2008)	18	Semi-structural interviews with the ERP project manager, users serving as team leaders during the implementation	Empirical	<ul style="list-style-type: none"> The perception of usefulness of the system in any phase of the implementation is dependent on the process Users' attitude towards the ERP system can change between acceptance, equivocation, resistance and rejection
Le et al. (2020)	356	Employees and managers of SMEs in Vietnam	Empirical	<ul style="list-style-type: none"> Organizational characteristics are directly associated with effectiveness of management information systems Manager's knowledge, user involvement, and information quality impact management information system effectiveness
Ajzen and Fishbein (1977)	47	Review of studies	Conceptual	<ul style="list-style-type: none"> There is a strong relationship between attitude and behaviour
Ajzen (1991)	unknown	Studies dealing with theory of planned behaviour	Conceptual	<ul style="list-style-type: none"> Attitude toward the behaviour, subjective norms, and perceived behavioural control are predictors of intentions to perform behaviours of different kind Considerable variance in actual behaviour is a result of these intentions, and perceptions of behavioural control

Authors	Sample size	Sample characteristics	Methodology	Findings
Lam, Cho and Qu (2007)	458	Employees who use IT equipment in hotels in Hangzhou, China	Empirical	<ul style="list-style-type: none"> • Attitude, self-efficacy, and subjective norm have positive impact on behavioural intention • Perceived IT beliefs impacts the intention through attitude formation
Kwok and Gao (2005)	75	Questionnaire from final year undergraduate students of the information systems department	Empirical	<ul style="list-style-type: none"> • Extrinsic motivation imposed no impact on an individual's attitude towards knowledge sharing • Absorptive capacity and channel richness have a significant impact an individual's attitude towards knowledge sharing
Tandon et al. (2020)	307	Consumers and non-consumers from India	Empirical	<ul style="list-style-type: none"> • Value has a positive impact on reasons (for and against) • Attitude and reasons (for) impact favourable purchase intentions • Reasons (for and against) fully mediate the relationship between value and attitude • Attitude partially mediates the relationship between reasons and purchase intentions
Wang et al. (2016)	308	Primary studies dealing with Upper Echelon Theory	Conceptual	<ul style="list-style-type: none"> • CEO characteristics (i.e., tenure, formal education, prior career experience, and positive self-concept) have a significant impact on firm strategic actions

Authors	Sample size	Sample characteristics	Methodology	Findings
				<ul style="list-style-type: none"> • CEO age has not significant impact on firm strategic actions • Firm strategic actions have a significant influence on future firm performance • CEO characteristics (i.e., age, tenure, formal education, and prior career experience) have positive impact on future firm performance
Boone and Hendriks (2009)	33	Interviews and questionnaire with CEOs from Belgian and Dutch Information technology firms	Empirical	<ul style="list-style-type: none"> • TMT's collaborative behaviour and information exchange are necessary requirements to release functional background diversity benefits, but they do not have association with locus of control diversity
Ndofirepi (2020)	308	Vocational education students	Empirical	<ul style="list-style-type: none"> • Psychological traits have a significant impact on entrepreneurial intentions
Xu et al. (2020)	211	New generation employees in research and development teams	Empirical	<ul style="list-style-type: none"> • Internal LOC, directly and indirectly, impacts innovative behaviour
Kithome (2012)	109	Tertiary level academic institutions in Mombasa County	Empirical	<ul style="list-style-type: none"> • The form of top-level management support, availability of project funds, technical aspects, and availability of qualified personnel are contributing factors to successful MIS implementations

Authors	Sample size	Sample characteristics	Methodology	Findings
Hiller and Hambrick (2005)	unknown	Analysis of papers related to CSE	Conceptual	<ul style="list-style-type: none"> • Core Self-Evaluation (CSE) is a valid construct to measure executive self-concept. • CSE is positively related to firm's strategic decision-making in terms of centralization and speed • CSE is negatively related to the comprehensiveness of firm's strategic decision-making processes • CSE is positively related to firm's performance
Judge and Ilies (2002)	65	Quantitative review of studies related to personality and performance motivation	Conceptual	<ul style="list-style-type: none"> • Neuroticism and Conscientiousness are the strongest and most consistent correlates of performance motivation • Big Five traits are an important predictors of performance motivation
Barrick, Mount and Gupta (2003)	57	Meta-analysis of studies related to relationship between personality and Holland's occupational types	Conceptual	<ul style="list-style-type: none"> • There are meaningful relations between some FFM personality dimensions and some RIASEC types
Hambrick (2007)	N/A	Refinement of the Upper Echelon Theory	Conceptual	<ul style="list-style-type: none"> • Senior managers' experiences, values, and personalities greatly impact their interpretations

Authors	Sample size	Sample characteristics	Methodology	Findings
				of the circumstances they face and, in turn, influence their choices
Judge et al. (2002)	4	Studies related to self-esteem, locus of control, self-efficacy, and neuroticism	Conceptual	<ul style="list-style-type: none"> Self-esteem, self-efficacy, neuroticism, and locus of control are indicators of Core Self-Evaluation
Judge et al. (2003)	4 independent samples	<p>Sample 1- 280 employees from three locations of a midwestern food service company</p> <p>Sample 2- 256 pharmaceutical salespersons employed by a large corporation headquartered in the eastern United State.</p> <p>Sample 3- 205 undergraduates enrolled at a Southeastern university.</p> <p>Sample 4- 126 undergraduates at a large midwestern university.</p>	Empirical	<ul style="list-style-type: none"> 12-item measure of Core Self-Evaluation scale (CSES) is reliable and valid CSES is significantly associated with job satisfaction, job performance, and life satisfaction

Authors	Sample size	Sample characteristics	Methodology	Findings
Hiebl (2014)	12	Articles related to Upper Echelon Theory in management accounting and control research	Conceptual	<ul style="list-style-type: none"> Younger and shorter-tenured senior managers with business-related backgrounds have more innovative and/or sophisticated management accounting and control systems
López-Muñoz and Escribá-Esteve (2017)	unknown	Model development	Conceptual	<ul style="list-style-type: none"> Middle-aged managers, with organizational and TMT tenure, high educational levels, and high IT competence levels, are most suitable to imbricate with IT
Besar, Ali and Ghani (2017)	150	Malaysian public firms	Empirical	<ul style="list-style-type: none"> CEOs' educational and functional background significantly impact the firm's financial restatements
Abatecola and Cristofaro (2018)	unknown	Literature review related to Upper Echelon Theory	Descriptive	<ul style="list-style-type: none"> Developments of UET emerging psychological and cognitive moderators of UE variables
Bui (2017)	7662	Employees from various types of UK organisations	Empirical	<ul style="list-style-type: none"> There is no significant relationship between extraversion and job satisfaction. There is a significant relationship between other four FFM and job satisfaction
Loukil, Yousfi and Cheikh (2020)		All listed firms on the SBF120 index between 2001 and 2013	Empirical	<ul style="list-style-type: none"> Senior managers' education background impact innovation effort

Personality traits of senior managers

Positive self-image

Research on personality traits of senior managers seems especially promising for helping to select those individuals that might be best suited for identifying and exploiting managerial opportunities in the market place (Wang and Wang, 2016). For example, individual traits and characteristics may be used by organisations, human resources, and recruitment agencies to identify individuals that would excel in senior management roles. Despite the potential importance of personality traits, there are still many unanswered questions regarding the implications of senior managers' personality in relation to their decision-making (Hiller and Hambrick, 2005). Understanding how senior managers' make decisions provides insights on the reasons they might not be supportive of MIS implementation, which can lead to a subsequent failure of the implementation. Also, there was a lack of a grounded theory to measure the concept of positive self-image until Judge et al. (2003), in their influential study, proposed Core Self-Evaluation construct (CSE) as a valid construct to measure positive self-image. Different authors use different terms referring to the concept of 'positive self-image' including 'positive self-regard' (Finkelstein, Hambrick and Cannella, 2009); 'positive self-concept' (Seo, Shen and Benner, 2019); 'personality traits' (Wang *et al.*, 2016). In this study, the term 'positive self-image' refers to the extent that senior managers positively assess themselves and their ability to influence their organisations. Studies investigating positive self-image show that positive self-image is positively related to the strategic actions of a firm (Wang et al. 2016), job satisfaction (Judge et al. 2003), job performance (Judge et al. 2003), life satisfaction (Judge et al. 2003), speed of a firm's strategic decision-making (Hiller and Hambrick, 2005), centralisation of a firm's strategic decision-making (Hiller and Hambrick, 2005), task motivation and performance of a firm (Erez and Judge, 2001) and firm's performance (Hiller and Hambrick, 2005). These findings highlight the importance of positive self-image in the upper echelon field of study and show that senior managers' positive self-image impact their choices (Hambrick, 2007). Therefore, the significance of these findings is that senior managers who have high positive self-image will engage more in high-risk strategic choices but the impact of self-image on MIS implementation has not been directly investigated .

Senior managers' positive self-image influences how senior managers process information about the environment and their capabilities. Senior managers' comprehension and interpretation of information impact their decisions (Finkelstein, Hambrick and Cannella, 2009). The construct of positive self-image

gives a comprehensive picture of how senior managers perceive their surrounding and their corresponding behaviour (Finkelstein, Hambrick and Cannella, 2009). These concepts show the reasons behind senior managers' choices to either support MIS implementation or not. When a senior manager has a favourable attitude toward MIS implementation because of his perceptions, he will manifest his favourable attitude by supporting it.

Although the concept of CSE has been introduced and uses four aspects i.e. self-esteem, generalised self-efficacy, emotional stability and locus of control (Judge, Erez, *et al.*, 2002) to define the concept of self-image, some researchers only use single elements of the construct in their investigations. A study by Ndofirepi (2020) makes no attempt to investigate the relationship between senior managers' self-image and their entrepreneurial intentions. But it was found that internal locus of control has a significant impact on entrepreneurial intentions. Lam *et al.* (2007) found that self-efficacy has a positive impact on behavioural intention. Xu *et al.* (2020) showed that internal locus of control impacts innovative behaviour both directly and indirectly. Boone and Hendriks (2009) found that senior management team (SMT) locus of control diversity has no significant impact on SMT's collaborative behaviour and information exchange. These findings show that senior managers' behavioural intention is influenced by their positive self-image. The single elements of self-efficacy and locus of control impact senior managers' behaviour, but they only show a narrow glimpse of the broader concept of positive self-image. Positive self-image provides more potent predictions of senior managers' behaviours than the individual elements (Judge, Erez, *et al.*, 2002). It is therefore important to investigate positive self-image to get more information on senior managers' behaviours toward MIS implementation.

Research objective and Research Questions

The objective of this thesis is to investigate the impact of senior managers' attitudes as contributing factors to their support in implementing Management Information Systems (MIS) in UK manufacturing organisations. The first aim is to measure how the influences of demographic characteristics of senior managers (including age, career type, tenure, education, involvement in IS projects) and how senior managers' personality traits influence/affect their attitude toward MIS implementation. The influences of senior managers' characteristics on their decision-making and firm performance are highlighted by researchers (e.g., (Li *et al.*, 2006; Chatterjee and Hambrick, 2007; Nielsen, 2009; Zarutskie, 2010)). Previous research has established that there is an association between an individual's attitude toward IS and their behavioural intention. For example, in their study, Quazi and Talukder (2011) investigated the

impact of individuals' demographics on their perceptions and technological innovation adoption. However, their study is limited because they only focused on personnel of one university in South Australia which limits the generalisability of their findings. A more comprehensive study would have included a sample of personnel in different universities. Although Lam, Cho and Qu (2007) found that employees' attitude toward IS impacts their behavioural intention, they only considered the users' perceived beliefs and task-technology fit as factors affecting their attitude. The study would have been much more useful if they had considered employees' demographics as a predictor factor of their attitude because an individuals' demographics form their attitude through their beliefs and cognitive values. Research to date has not yet investigated the impact of senior managers' characteristics on their attitude toward MIS implementation in UK manufacturing organisations.

As mentioned previously the manufacturing sector plays a critical role in the UK economy, therefore the focus of this study is on UK manufacturing organisations. Manufacturing organisations need MIS to coordinate their activities (Kebede and Bruwer, 2002), connect their employees, data and systems to enable better collaboration and be more efficient (The Manufacturer, 2021c). MIS provides production forecasts and performance of individual supplier, which enables a quick assessment of the overall health of an organisation's supply chain and underlying activities (Attatsitsey and Bonsu, 2021). Therefore, MIS is critical for manufacturing organisations and has a significant effect on their profitability and productivity.

The second aim of this study is to examine the mediating role of senior managers' attitude in the relationship between their characteristics and their support for MIS implementation. Mediation analysis gives a better understanding of the underlying mechanism of senior managers' support toward MIS implementation. Understanding the reasons behind senior managers' decisions to provide the required commitment and support toward the MIS implementation process provides insights on how to implement MIS successfully. Few studies have investigated the mediator role of attitude (Tandon *et al.*, 2020). However, they investigated the mediation role of consumers' attitude in their purchasing intentions. Very little is currently known about how a senior manager's attitude connects to their character and support toward MIS implementation. Thus, this study aims to investigate whether senior managers' attitude mediates the impact of their character on their support of MIS implementation.

Therefore, to address these research objectives, the study focuses on four overarching research questions (RQ). The first two research questions are discussed and the hypotheses related to them are presented here. In the next section, two other research questions focusing on the personality traits of senior managers are presented and each research question is followed by its relevant hypotheses.

RQ1: To what extent, do the demographic characteristics of senior managers and their personality traits impact on their attitude toward MIS implementation?

RQ2: To what extent does the senior managers' attitude toward MIS implementation mediate the impact of characteristics of senior managers on the implementation of MIS?

Hypotheses

Impact of senior managers' characteristics on their attitude

To address Research Question 1, this section develops hypotheses which relate to the impact of senior managers' characteristics on their attitude. The objective of Research Question 1 is to investigate the impact factors that contribute to a senior manager's attitude. Age, career variety, tenure, education, involvement in IS projects, and positive self-image were examined as the contributing factors of a senior managers attitude. The researcher had to create a measure for attitude and support and the initial validity of these measures was checked. However, further validation of these measures was beyond the scope of the current research project. Based on the literature, the following sections present hypotheses development with regard to the impact these contributing factors have on senior managers' attitude.

Impact of senior managers' age on their attitude

Some studies used a conceptual approach to investigate the effects of senior managers' age (Hambrick and Mason, 1984; Hiebl, 2014; Wang *et al.*, 2016; López-Muñoz and Escribá-Esteve, 2017). For example, Hambrick and Mason (1984) found that younger senior managers take more risk. They might introduce more strategic actions because of their limited cognitive schema (an individual's pattern of thoughts that organises categories of information (Evans, 1967). Hiebl (2014) found that younger senior managers have more innovative and sophisticated management accounting and control systems, which indicates that younger senior managers are more open to learning new and complex systems. López-Muñoz and Escribá-Esteve (2017) suggested that middle-aged managers are most ready to be involved with IT. However, they did not provide any explanation of why they were suggesting this or give a definition of the term 'middle-aged manager'. The findings mentioned above show that senior managers' age might have an impact on their attitude toward MIS implementation as age can impact an individual's perceptions.

Other studies empirically investigated the impact of age. Serfling (2014) found that older senior managers are reluctant to learn new information quickly because they are more committed to their existing conditions. The study would be more beneficial if the author had mentioned the industry and the size of the firms in the sample, which would provide a better understanding of the context of the study. The firm size is important because the author also investigated the impact of age on the firms' investment, which, depending on the size of the firm, the results might not be valid as access to financial resources differs depending on the size of the firm. Moreover, the industry of the sample is also important as risks associated with investment in different industries varies. Similarly, Barker and Mueller (2002) found that CEO's *age* has a strong negative impact on R&D spending citing that when senior managers are younger, their time perspective can be longer implying that older senior managers might focus more on short-term goals because of their shorter time perspective. Taken together, these studies support the notion that younger senior managers are more likely to show a favourable attitude toward MIS implementation because they are more open to taking risks and learning new systems. Conversely, Barzekar and Karami (Barzekar and Karami, 2014) found no link between age and computer usage. They investigated the impact of middle managers' age in hospitals from different age groups, younger than 30, 31-40 and 40+ on their usage of IT applications. Their study investigated how comfortable middle managers are in using IT systems in general which is entirely different to implementing MIS.

Although there is a general agreement about the negative impact of senior managers' age on their attitude, no single study exists which investigates the impact of senior managers' age on their attitude in the UK manufacturing context. Until now, there has been little attention paid to the impact of board level senior managers' characteristics on their decision to implement MIS in UK manufacturers. The sample industry is important because some industries are faster in taking up MIS than others, which might force organisations in the same industry to implement MIS to keep their competitive advantage. There are two main reasons that the impact of senior managers' age on their attitude in UK manufacturing organisations should be investigated. Firstly, UK manufacturing organisations are at relatively early stages of MIS implementation (The Manufacturer, 2019) which indicates that they are slower adopting MIS. Secondly, 99.12% of the manufacturing population in UK is accounted for by SMEs (companies with less than 250 employees) (Department for Business Innovation and Skills, 2020). SMEs might have different response to MIS implementation in comparison to large organisations due to their limited access to financial resources. Therefore, in the context of UK manufacturing, older senior managers may have less favourable attitude toward MIS implementation because their organisations may have limited access to financial

resources and MIS implementation involves investing a large amount of money which makes the implementation decision riskier.

Therefore, the first hypothesis is proposed as:

Hypothesis 1: Senior managers' age has a negative impact on their attitude toward MIS implementation in UK manufacturing organisations.

Impact of senior managers' career variety on their attitude

Senior managers' prior career experience refers to the time that a senior manager worked in various positions before becoming a senior manager. Hambrick and Mason (1984) found that CEO prior career experience impacts his strategic choices by shaping the way he interprets information and uses it to make decisions. Three main types of CEO prior career experience have been investigated in UET research. Firstly, CEO functional background, which is defined as primary business disciplines and operational areas that CEO worked in (Barker and Mueller, 2002). Secondly, CEO's general career experience, which was identified as the number of years that a manager had worked before in a particular industry before becoming the senior manager (Simsek, 2007). This was also defined as managers' prior career experience at executive level before becoming the CEO by Chen *et al.* (2018). Thirdly, some researchers studied senior managers' international experience. For example, Zhu, Hu and Shen (2020) found that international experience of CEOs impacts their performance in international organisations. These types of prior career experience do not provide a comprehensive picture of senior managers' experience because they do not include both professional and institutional experiences of a senior manager.

In order to capture senior managers' professional and institutional experiences, Crossland *et al.* (2014) first used the term 'career variety'. Career variety indicates the breadth of work experience a manager has gained in the course of his career before becoming a CEO. It shows managers' involvement in different industry sectors, firms, and functional areas (Crossland *et al.*, 2014). The career variety of senior managers is essential in enhancing their experience of MIS implementation for effective functional management. The greater diversity of past experiences a manager has, the increased ability they have in overseeing operations and special tasks in a business. Ahn, Minshall and Mortara (2017) stated that there are certain skills and abilities which create an impact on the attitude of a manager towards MIS implementation. The foremost aspect is the technical proficiency or the expertise a manager develops with different job experiences. They investigated the impact of CEOs' work experience on open innovation (OI) adoption in Korean manufacturing SMEs. They only investigated the work experience of CEOs as

number of years they had experience and their functional track and did not include the number of industries that a CEO worked in before, which may impact their attitude toward OI adoption.

Furthermore, as stated by Díaz-Fernández, González-Rodríguez and Simonetti (2020), career variety has a great impact on the attitude of a manager as the skills acquired by a manager are essential in resolving problems faced by a firm. These managers possess the diversity of experiences so that they know the importance of information technology systems for the progress of the employees. The authors (Díaz-Fernández, González- Rodríguez and Simonetti, 2020) investigated the impact of top management team diversity on firm performance which is different to examining individual senior managers. If a manager has a greater level of experiences and knowledge, he will make the decision to enhance the MIS to enable the business to compete globally (Mitra and Mishra, 2016). Crossland et al. (2014) highlighted that the experience of CEOs or top-level management is crucial when considering the increased likelihood of MIS implementation within an organisation. They further provide evidence within their research that career variety is positively linked with firm-level strategic novelty. Zhu, Hu and Shen (2020) proposed that prior board experience in other firms has a positive impact on the strategic changes made by a manager. The study does not consider the other aspects of prior career experience such as their experience in different industries and job functions which demonstrate their cumulative cognitive breadth (i.e., awareness of multiple perspectives) and their openness to change. Although several empirical studies examined the impact of senior managers' prior career experience, no single study exists which investigates the impact of senior managers' career variety on their attitude in the UK manufacturing context. Career variety manifests how open a senior manager is to change and how committed they are to their organisation's current strategies. Senior managers with higher career variety are psychologically less committed to their organisations current strategies and are more open to change (Hambrick, Geletkanycz and Fredrickson, 1993). In a UK manufacturing context organisations are at relatively early stages of MIS implementation, so a senior manager with greater career variety might be more open to the implementation and show a more positive attitude toward MIS implementation.

Thus, the second hypothesis is:

Hypothesis 2: Senior managers' career variety has a positive impact on their attitude toward MIS implementation in UK manufacturing organisations.

[Impact of senior managers' tenure on their attitude](#)

Tenure refers to the time a senior manager has held his position within the business. In a conceptual study, Loonam et al. (2014) proposed that tenure reflects the amount of experience managers obtained

at their current position. Kim (2018) took an empirical approach and examined the relationship between tenure and desirable behaviours of organisational citizenship behaviour (OCB) (i.e. tendency to help colleagues), public service motivation (i.e. desire to do voluntary work) and undesirable behaviours including turnover intention (i.e. intention to leave the organization) and burnout (i.e. employees' frustration with their job). In this study it was shown that organisational tenure has a negative impact on OCB and turnover intention in public sector organisations of South Korea. This is due to the organisational socialization impact at the beginning of an employment where high levels of OCB and turnover intention are developed. The findings indicate that shorter-tenure senior managers may have more tendency to support other employees during MIS implementation.

Similarly, Bergh (2001) suggested that organisational tenure is negatively associated with acquisition outcome success because as shorter-tenure senior managers they would adapt better and manage more effectively during the uncertainty and challenges of the acquisition. Shorter-tenured CEOs can perform better at post-acquisition management because they can more easily accept change (Hambrick, Geletkanycz and Fredrickson, 1993) which leads to more successful acquisition outcomes. Shorter-tenured executives are more willing to make strategic changes because they are less familiar with their firms' existing values, norms and policies (Donaldson, 1997), while long-tenured managers are more committed to prior strategies (Finkelstein and Hambrick, 1990). Managers committed to prior strategies and systems of the organisations, who rely on familiar information systems, would be more resistant to change.

Hermano and Martín-Cruz (2016) proposed that the longer top-level managers spend in a certain position, the more they become comfortable with the software or system that is being used in the organisation and tend to perceive MIS as an operational tool that has little or no impact in the process of strategic decision-making. Their findings indicate that longer-tenured senior managers are unwilling to implement a new MIS system because of their perception that they do not need a new system to help them to make strategic decisions and they are capable of making decisions with the system that they are already using. Furthermore, Lin, Ku and Huang (2014) highlighted that the majority of the top-managers perceive that within a boardroom, the need for MIS tools and system is not necessary because the boardroom is the area for 'strategic thinking' and discussion and the system that is currently being used is beneficial for the top management. Kim, Kumar and Kumar (2012) contributed to this line of research and proposed that in some situations senior managers are reluctant to learn new knowledge regarding latest systems as they are more comfortable with the use of existing systems. However, they did not provide information regarding the company size and industry from which their sample was selected. Type of industry is

important as some industries are more digitally enhanced and require to adopt latest systems faster. Firm size is also important as larger companies and SMEs might be different in their strategic understanding of the market their and responsiveness to it.

These findings indicate that longer-tenured managers might show unfavourable attitude toward MIS implementation because they are unwilling to deal with the inconveniences of learning to use a new system. Although, there is a general agreement in the literature that shorter-tenure senior managers are more open to changes, the impact of senior managers' tenure on their attitude in the UK manufacturing context has not been examined before.

Therefore, the third hypothesis is:

Hypothesis 3: Senior managers' tenure has a negative impact on their attitude toward MIS implementation in UK manufacturing organisations.

Impact of senior managers' education on their attitude

Executives' level of education is another important demographic characteristic determining senior managers' attitude. Quazi and Talukder (2011) empirically investigated the impact of employees' level of education on their attitude toward acceptance of technological innovation in an Australian university. They showed that employees' positive attitude toward an innovation is influenced by their education level. However, the study is limited to only one Australian organisation, which may affect the generalisation of the results.

Similarly, Barzekar and Karami (2014) found that education level (i.e. Bachelor, Master, PhD) of middle managers has a strong impact on the comfortable use of MIS, which implies that education levels facilitates users' understanding of a system. However, a more comprehensive study would include all levels of education such as college degree and diploma. Mohammed and Hu (2015) highlighted that managers who are well equipped with a higher level of pre-requisite knowledge can better understand the importance of MIS in regard to organisational success and assisting the business to achieve predetermined objectives and goals.

Escribá-Esteve, Sánchez-Peinado and Sánchez-Peinado (2009) showed that CEOs with higher level of education can analyse information better in unexpected market conditions. They are also more interested in innovation engagement and have stronger managerial skills (Lin *et al.*, 2011). In a conceptual study, Loonam *et al.* (2014) suggested that the level of formal education of senior management is considered to have a positive impact on the attitude of managers toward IS because senior managers with a higher education degree are more open to new innovations and technologies, thus they cope better with IS

projects. Lin *et al.* (2011) empirically investigated the impact of senior managers' education on firm's innovative activities in a large sample of private Chinese manufacturing firms. They found that CEOs' level of education positively impacts their cognitive abilities and R&D decision makings. This indicates that senior managers' education level shapes their attitude through developing their cognitive abilities. Similarly, Loukil, Yousfi and Cheikh (2020) proposed that more educated CEOs have more willingness to invest in R&D. In contrast, Barker and Mueller (2002) found no link between a senior manager's education and a firm's R&D spending once they attain a college degree. Their study would have been more generalisable if they had included information about the industries and geographical location of their sample. A possible explanation for these mixed results may be due to the different cultures where the studies were conducted. These studies indicate that senior managers with higher education can understand the importance of MIS better due to their higher cognitive abilities. Thus, they will more likely have a more favourable attitude toward MIS implementation. Previous published studies do not examine the impact of senior managers' education in the UK manufacturing context where the majority of organisations are SMEs and at relatively early stages of MIS implementation.

Therefore, the fourth hypothesis is:

Hypothesis 4: Senior managers' education has a positive impact on their attitude toward MIS implementation in UK manufacturing organisations.

Impact of senior managers' involvement in IS projects on their attitude

Iskandar (2015) defines user involvement as the user's participation in the process of implementing MIS from planning, developing and to using MIS. In this study, a senior manager's prior involvement in IS implementation refers to activities he or she performed in IS implementation, such as being the project leader and having responsibility for project success. Researchers have long been interested in the relationship between user involvement and system success (Damodaran, 1996; Palanisamy, 2001; Harris and Weistroffer, 2009; Pankratz and Basten, 2018; Le *et al.*, 2020). Some researchers used a conceptual approach to study user involvement (Damodaran, 1996; Harris and Weistroffer, 2009). Damodaran (1996) found that user involvement in developing IS had some benefits. These benefits are a better understanding of the system by the user leading to more effective use, higher acceptance of the system and more participation in decision-making. Similarly, Harris and Weistroffer (2009) conducted a review on 28 empirical research studies between 1996 to 2009 and they also showed that user involvement in the process of IS development is associated with system success.

Other studies used an empirical approach to study the impact of user involvement (Palanisamy, 2001; Pries-Heje, 2008; Hermano and Martín-Cruz, 2016; Pankratz and Basten, 2018; Le *et al.*, 2020). In their exploratory study, Pankratz and Basten (2018) interviewed 11 IS project managers in Germany who were chosen by convenience sampling. They maintained that the more experience a manager has in IS projects, the deeper is the insight they have into projects. They also showed that users' participation or involvement in software development projects positively impacts system success. A better designed study would examine a larger, randomly selected sample to provide more comprehensive results. Palanisamy (2001) examined the relationship between user involvement and IS success in Indian organisations from different business sectors. They claimed that there is a positive association between user involvement in IS planning and MIS success. This is because when users are involved in IS planning and if they perceive IS to be highly useful for their job performance then their attitude toward IS implementation will be more positive. Similarly, Le *et al.* (2020) found that there is a positive association between user involvement and MIS effectiveness in Vietnamese SMEs. The results from this study would have been more useful if it had included the type of sectors in which the SMEs were operating. Pries-Heje (2008) demonstrated that users' attitude toward ERP implementation was more positive as their knowledge of the system increases. Hermano and Martín-Cruz (2016) examined the relationship between senior management involvement and project performance. They targeted CEOs from varying industries around the world. However, their sample size was small (62 cases) but they also found that senior management involvement has a positive impact on project performance. The studies presented indicate that the more senior managers get involved in the implementation process the more their knowledge about the system increases, which impacts positively their attitude toward the system. Much of the research up to now has been focused on the impact of users' involvement in a current project on their attitude rather than the impact of senior managers' prior involvement in IS projects on their attitude.

Therefore, the fifth hypothesis is,

Hypothesis 5: Senior managers' prior involvement in IS projects has a positive impact on their attitude toward MIS implementation in UK manufacturing organisations.

[Impact of senior managers' positive self-image on their attitude](#)

Personality is conceptualised from a variety of theoretical perspectives. These perspectives and approaches have made a unique contribution in this field of interest where there is a need to determine how personality traits predict the job performance of an individual. The five-factor model (FFM) is one of the prominent paradigms of personality traits (see Costa and McCrae (1992)). These five factors are

Neuroticism, Extraversion, Openness to experience, Agreeableness and Conscientiousness. Neuroticism is the opposite of emotional stability, and is where an individual has poor emotional adjustment and has a tendency to be more anxious and depressed (Barlow *et al.*, 2014). Extraversion demonstrates how sociable and positive an individual is (Wilt and Revelle, 2009). Openness to experience refers to an individual's tendency to be creative and flexible. An individual who scores high on Agreeableness is kind and trustworthy. Conscientiousness refers to the tendency to be achievement striving (Costa and McCrae, 1992). FFM has received little attention in UET research because senior managers are often reluctant to fill in lengthy questionnaires to operationalise the FFM (Hambrick, 2007). Therefore, UET studies focused on individual personality constructs (e.g., locus of control, self-esteem, self-efficacy and emotional stability) to demonstrate the positive self-image of an individual (Hiller and Hambrick, 2005). Quantifying these constructs assists researchers to differentiate individuals by their pattern of thoughts, feelings and actions (Costa and McCrae, 1992). These four well-studied constructs have significant conceptual similarities and the area of their similarity make up the underlying evaluation a person makes of oneself, which refers to positive self-image. Positive self-image brings all four constructs together and leads to a more potent prediction of a person's behaviours than the individual variables (Hiller and Hambrick, 2005).

Because self-image is important in influencing a senior managers' attitude toward implementing MIS, it is worth defining the concept of self-image. Wang *et al.* (2016) defined self-image as a combination of various beliefs one holds about oneself. Farrar, Stopa and Turner (2015) contributed to the field by highlighting that beliefs of others about oneself also contribute to the process of self-constructing the beliefs about oneself. These studies indicate that senior managers' self-image encompasses and consolidates both their own beliefs about themselves and others' beliefs about them, which then shapes their attitude toward MIS implementation. Peixoto and Almeida (2011) and Di Fabio and Kenny (2016) found that there are multiple factors that contribute to the formulation of self-image, such as ideal self and self-esteem. The study of Weng and McElroy (2010) concluded that age, education and media are other factors that facilitate a person in framing their self-image. In contrast, the study of Evert *et al.* (2018) considered culture, gender, relationship, and appearance to be major determinants that contribute to formulating a self-image about one oneself. Additionally, the study of Seo, Shen and Benne (2019) highlighted that there are several sub-factors such as locus of control and self-esteem which assist an individual in developing either a positive or negative self-image about themselves. The research of Farrar, Stopa and Turner (2015) suggests that self-efficacy and emotional stability are two major determinants that contribute to establishing positive and negative self-image of oneself. It can be seen that the literature defines positive self-image in many ways and therefore demonstrates why researchers have

used different constructs to measure the same concept demonstrating the complexity of positive self-image. The present study is using positive self-image to include all four variables mentioned above (locus of control, self-esteem, self-efficacy and emotional stability) to predict senior managers' attitude toward MIS implementation.

In their ground-breaking study of positive self-image, Judge *et al.* (2003) introduced the concept of Core Self-Evaluation (CSE) as an effective approach or framework to measure positive self-image using the four underlying personality traits of self-esteem, generalised self-efficacy, emotional stability, and locus of control. Self-esteem demonstrates how an individual evaluates his self-worth (Rosenberg, 1965). Self-efficacy refers to an appraisal of an individual's ability to perform successfully in situations. Emotional stability is one's tendency to feel safe and calm. Lastly, locus of control is a person's belief that desired outcomes are a consequence of one's behaviour not from fate (Judge, 2002). CSE is a method to measure how an individual assesses himself and his relationship with the environment (Judge *et al.*, 2003). These four traits are highly correlated (Judge *et al.*, 2003). Their work is significant to the field because they proposed a 12-item scale which connects all four well-studied concepts of positive self-image and enables researchers to quantify senior managers' positive self-image. CSE has been validated in several studies (e.g., Gardner and Pierce (2010)), but its relevance to senior managers and their attitude has not been examined widely. In this study, CSE was used as a tool to measure positive self-image because it provides a more potent predictor of senior managers' attitude which consequently leads to a better understanding of the underlying reasons behind a senior managers' favourable attitude toward MIS implementation. Senior managers' attitude significantly impacts the success of MIS implementation because if they have favourable attitude toward MIS implementation, they will be more likely to provide the resources needed for implementation to be successful.

Barrick, Mount, and Gupta (2003) and Judge and Ilies (2002) supported the opinion that senior managers with a more positive self-image are more confident and optimistic, so it could be assumed that they are more confident in making decisions with high risk. Chatterjee and Hambrick (2011) found that such narcissism has a positive influence on mergers, R&D expenses, and capital expenditures. This is because a senior manager assesses risk based on his or her confidence. According to Hiller and Hambrick (2005), an individual with a healthy amount of narcissism can function successfully because it gives him or her secure self-esteem to survive everyday life. Thus, it is predicted that there is a positive association between senior managers' positive self-image and attitude toward MIS implementation. MIS implementation requires a significant amount of financial resources and time investment (Amid, Moalagh

and Zare Ravasan, 2012), therefore, a more confident senior manager is more likely to make a decision to implement MIS.

Similarly, Finkelstein (1992) found that top management team (TMT) characteristics predict their strategic behaviour. Positive self-image is one of a manager's characteristics which shows how a person appraises their self-worth and capabilities and it is conceptualised as a higher-order construct. Personality theorists (e.g., Cattell (1965)) showed that positive self-image as a fundamental trait has a strong association with attitude. Experiences, values and personalities impact on an individual's information processing behaviour (field of vision, selective perception, interpretation) (Hambrick and Mason, 1984). These findings demonstrate the underlying factors which play a part in developing an individual's behaviour. Therefore, there is a strong association between senior managers' attitude toward MIS implementation and their positive self-image.

Judge and colleagues (2003) proposed that an individual takes actions because of their core self-evaluations which may indicate that a senior manager having a certain self-image will undertake to support MIS implementation. In a longitudinal study, Brown *et al.* (2007) investigated the impact of positive self-image on a large sample size of employed alumni of a north-eastern university and found that individuals' positive self-image impacts their commitment. By investigating employees of only one university, they have limited the generalisation of their findings. Their failure to include the country where this university is located makes it difficult to understand any cultural influences which may have affected their results. Similarly, Kamer and Annen (2010) conducted a longitudinal study to investigate the impact of self-image of Swiss armed force cadres on their commitment. They demonstrated that individuals with a more positive self-image are more committed to the goals they set. Both studies used CSE as a tool to measure positive self-image and found the same results, which indicates that the tool is robust. One possible implication of these studies is that self-image impacts an individual's commitment to their job regardless of their career. People with a high positive self-image are more committed to pursuing opportunities that are presented to them (Yurchisin, Park and O'Brien, 2010). These findings suggest that positive self-image increases senior manager's commitment resulting in greater support of MIS implementation.

Erez and Judge (2001) found that a person with higher positive self-image has increased motivation to perform tasks, which can infer that they will have more motivation to support innovations and new IS projects. Individuals with high positive self-image view their circumstances more positively and are less sensitive to negative information (Chang *et al.*, 2012). Therefore, they are more positive to the challenges

of new MIS implementation and more committed to supporting it. Given the significance of the findings above, the sixth hypothesis is:

Hypothesis 6: Senior managers' positive self-image has a positive impact on their attitude toward MIS implementation.

Mediating role of senior managers' attitude

This section proposes the hypotheses that are going to be applied to address Research Question 2, which concerns the mediating role of senior managers' attitude. Attitude can be described as a person's disposition to react well or badly to an individual, an item, an organisation or an event, or to the way that an individual appraises a behaviour (Ajzen and Fishbein, 1977). In their wide-ranging study of individual behavioural intention to adopt IT, Lam, Cho and Qu (2007) investigated the impact of self-efficacy, attitude, perceived IT beliefs and subjective norm on the intention to adopt IT. They found that positive attitude has a positive impact on the intention to adopt IT. They also showed that the productive outcome of any manufacturing project depends on the integrity and commitment of the senior management that drives the workforce towards the success of the project (Elbanna, 2013). In addition, Lin (2010) demonstrated that the optimistic attitude of senior management towards themselves is of vital importance in order to maintain optimum productivity during the execution of projects as it ensures the required level of commitment and determination of the workforce for the project's success. These studies show the underlying influence of senior managers' attitude on their support toward IS project. The studies thus far provide evidence that senior managers manifest their favourable attitude toward MIS implementation by supporting it through their commitment and allocation of required resources for the implementation process.

Intention is defined as an individual's attempt to perform a behaviour (Fishbein and Ajzen, 2010). According to Lam, Cho and Qu (2007), behavioural intentions have a positive correlation with actual behaviour. The seminal theory of planned behaviour (Ajzen, 1991) suggests that the more positive attitude an individual has toward a behaviour, his intention to perform the behaviour is stronger. In the context of this study, senior managers' intention to implement MIS is determined by their perceptions about the positive and negative results of implementing MIS (attitude).

Kwok and Gao (2006) argued that an individual is more likely to perform a behaviour when he or she possesses a positive attitude. A favourable attitude is also likely to encourage employees to adopt and

use an innovation (Quazi and Talukder, 2011). These findings are important because they highlight a causal relationship between attitude and support, which shows why different senior managers show different degrees of support toward MIS implementation. The literature (Tandon et al., 2020) suggests that a positive attitude is significantly correlated with the readiness to participate in a given behaviour. Tandon *et al.*'s (2020) study is thorough because they also investigated the mediation effect of attitude between reasons and intentions. Mediation analysis gives better understanding of the underlying mechanism of senior managers' support toward MIS implementation. They further assert that in some cases when the direct impact of determinants of attitude is not significant, mediators become crucial since they link determinants with attitude and intentions. Table 3 summarises the studies conducting mediation analysis in the upper echelon field. Mediation has received inadequate attention in the upper echelon field of study, and little is known about how mediators affect senior managers' attitude in organisations. This study contributes to the literature by examining the mediating role of attitude in MIS implementation support in UK manufacturing organisations. The indirect effect of age, career variety, tenure, education, involvement in IS projects, and positive self-image on senior managers' support via their attitude is examined. H7a to H8 are generated to answer Research Question 2.

Therefore, the rest of the hypotheses are as follow:

H7a Senior managers' attitude mediates the relationship between senior managers' age and their support.

H7b Senior managers' attitude mediates the relationship between senior managers' career variety and their support.

H7c Senior managers' attitude mediates the relationship between senior managers' tenure and their support.

H7d Senior managers' attitude mediates the relationship between senior managers' education and their support.

H7e Senior managers' attitude mediates the relationship between senior managers' involvement in IS projects and their support.

H8 Senior managers' attitude mediates the relationship between senior managers' positive self-image and their support.

Figure 1 graphically depicts the set of relationships, inner, and outer model.

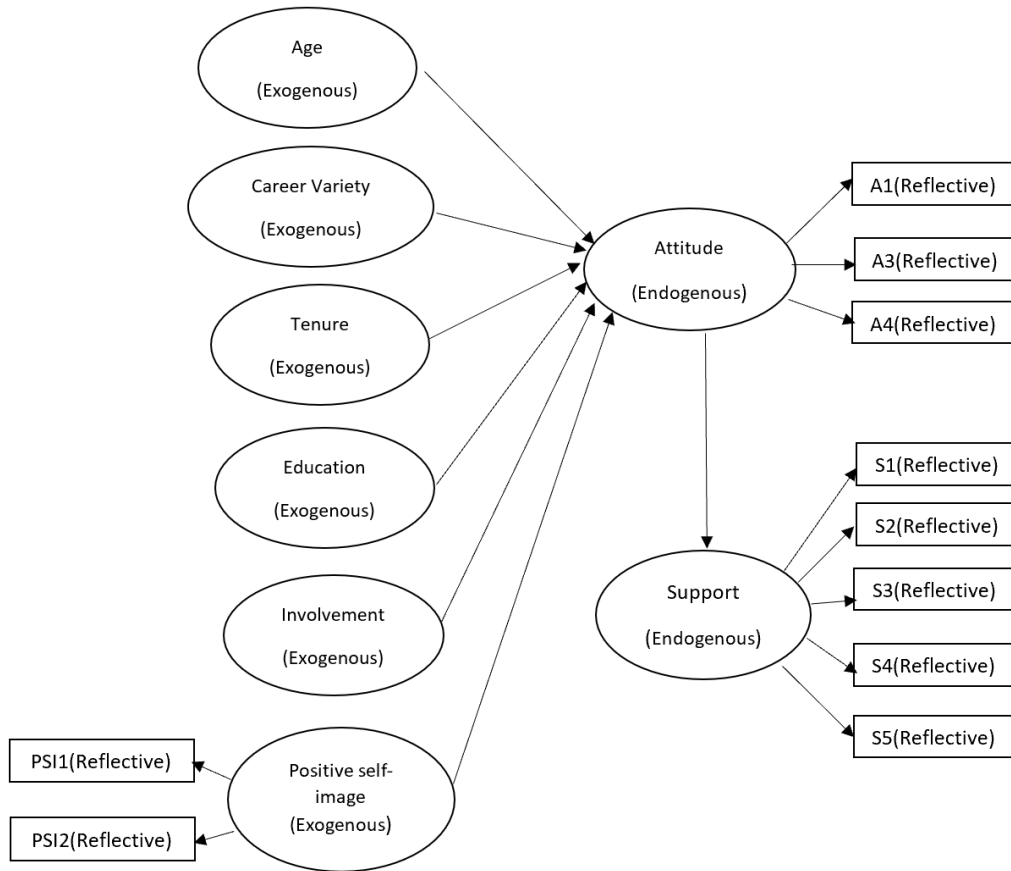


Figure 1: The theoretical model of Study 1. Age=Senior managers' age, Career variety= senior managers' career variety, Tenure=senior managers' tenure, Education= Senior managers' highest level of education, Involvement=senior managers' prior involvement in IS projects, PSI=Positive self-image, A=Senior managers' attitude toward MIS implementation, S=senior managers' support toward MIS A1: senior managers' opinion regarding value of MIS; A3: senior managers' opinion regarding efficiency and time-saving of MIS; A4:senior managers' opinion about benefits of MIS; support: senior managers' decision to support MIS implementation; S1: senior managers' readiness to support MIS; S2: senior managers' use of change management strategies; S3: senior managers opinion regarding MIS implementation; S4:likelihood that senior managers support MIS implementation; S5: senior managers' readiness to involve in MIS implementation; PSI1: positive aspects of positive self-image; PSI2: negative aspects of positive self-image; education: senior mangers' highest level of education; involvement: number of IS projects that senior managers involved in.

Table 3: Mediation in the upper echelon literature

Author	Independent variable(s)	Dependent variable(s)	Mediator	Findings
Quazi and Talukder (2011)	Age level Education level Training level	Technology acceptance behaviour	Attitude toward technological innovation	<ul style="list-style-type: none"> • Employees' level of education and level of training have significant positive impact on attitude. • Employees' age has no significant impact on their attitude. • Employees' attitude has a positive significant impact on acceptance of technological innovation.
Wang et al. (2016)	Age Tenure Formal education Prior career experience Positive self-concept	Firm performance	Firm strategic actions	<ul style="list-style-type: none"> • Tenure, formal education, prior career experience, and positive self-concept have significant impact on firm strategic actions. • Firm strategic actions have a significant influence on future firm performance.
Jarvenpaa and Ives (1991)	Executive participation	Progressive use of IT in the firm	Executive involvement	<ul style="list-style-type: none"> • Executive involvement, participation, age, and functional background have

Author	Independent variable(s)	Dependent variable(s)	Mediator	Findings
	Organizational conditions Executive background			<p>significant impact on progressive use of IT.</p> <ul style="list-style-type: none"> • Executive participation and organizational conditions are associated with executive involvement. • Age and tenure is related to executive participation
Hermano and Martín-Cruz (2016)	Top management involvement	Project performance Portfolio performance	Project operational capabilities Portfolio dynamic cap	<ul style="list-style-type: none"> • Operational and dynamic capability building mediate the relationship between top managers and project, portfolio, and firm performance. • Top management involvement is positively related to project performance
Le et al. (2020)	Organization characteristics Management knowledge Management commitment User involvement	MIS effectiveness	Information quality	<ul style="list-style-type: none"> • Organizational characteristics are directly associated with effectiveness of management information systems. • Manager's knowledge, user involvement, and information quality impact management information system effectiveness

Author	Independent variable(s)	Dependent variable(s)	Mediator	Findings
Lam, Cho and Qu (2007)	Perceived IT beliefs Task-technology fit Self-efficacy Subjective norm	Behavioural intention	attitude	<ul style="list-style-type: none"> • Attitude, self-efficacy, and subjective norm have positive impact on behavioural intention. • Perceived IT beliefs impacts the intention through attitude formation
Tandon <i>et al.</i> (2020)	Value Reasons for Reasons against	User intentions	Attitude Reasons for Reasons against	<ul style="list-style-type: none"> • Value has a positive impact on reasons (for and against) • Attitude and reasons (for) impact favourable purchase intentions. • Reasons (for and against) fully mediate the relationship between value and attitude. • Attitude partially mediates the relationship between reasons and purchase intentions

Personality traits (the Big Five and positive self-image) and MIS implementation

Costa and McCrae (1992) defines personality traits as observable differences in individuals' tendencies to display consistent patterns of feelings, thoughts, and actions. The Big Five introduced by Tupes and Christal (1961) and then by Norman (1963) organised a vast variety of personality traits into a small but meaningful set of personality variables enabling investigation of reliable relationships (Zhao and Seibert, 2006). The Big Five is influenced by many factors including genetic components, life experiences, and upbringing (Shane and Nicolaou, 2013) and its changes were greatest in magnitude in emerging adulthood (Schwaba and Bleidorn, 2018). This might be because individuals in midlife may generally have the ability to create stability which limits the impact of environment on their personality, while emerging adults may explore different environments and life paths including major life experiences (i.e., marriage, starting careers, moving residences, and engaging in identity exploration (Arnett, 2006)) that might impact their personality. Therefore, the Big Five can be used to investigate the relationship between senior managers' personality traits and their attitude toward MIS implementation since the personality traits will be less inclined to change in senior managers because in general they are beyond the age of being emerging adults. Evidence indicates that the Big Five structure can be generalised across cultures (Hofstede and McCrae, 2004). Also, individuals from the same culture do not necessarily share the same personality style (McCrae and Costa, 2003). This is important because it means that a study in the UK context can be generalised in other cultures. As Judge, Bono, *et al.* (2002) suggest leaders' personality might be more important when they have high situational control (i.e., the situation which allow the leader to influence the groups' behaviour and exert power e.g., where there is an opportunity to recruit and fire, increase or lower salaries, promote or transfer (Fiedler, 1971)) since these situations might allow personality traits to be more powerful. As such, studying board level senior managers' personality is crucial since they have high situational control over strategic decisions such as implementing MIS in their organisations.

Positive self-image plays an important role in individuals' attitude at work (Bono and Judge, 2003). Studying the relationship between positive self-image and wide-ranging personality taxonomies such as the Big Five is critical for two main reasons: firstly, the Big Five might capture a part of the personality field that positive self-image with its dispositional nature (Chamorro-Premuzic, Ahmetoglu and Furnham, 2008) does not represent sufficiently. Chamorro-Premuzic, Ahmetoglu and Furnham (2008) examined the relationship between positive self-image (operationalised by CSE), the Big Five and test anxiety (TA) in a sample of 388 US and UK university students. They found that when the Big Five, particularly Neuroticism (N), are taken into account, the impact of positive self-image on test anxiety is substantially reduced. They suggested that the Big Five is a better predictor of TA than CSE. Conversely, Caliendo, Fossen and Kritikos'

(2011) empirical findings show that the Big Five only partially explains entrepreneurial decisions (i.e. decision to become and stay self-employed). Their findings showed the Big Five contributing 12.8 to 14.2 percentage points to the explanatory power of the full model of the probability of being self-employed. They argued that if the Big Five fully described the relevant personality traits, adding another personality variable would not further enhance the model. They found that considering further personality traits (i.e. risk tolerance, internal and external locus of control) add further 4.4 to 8.0 percent and 5.9 to 8.8 percent respectively to the model's explanatory power. In the same vein, Judge, Bono, *et al.* (2002) suggested that lower order traits such as dominance and sociability, predict leadership better than overall measures of Extraversion. This is because the Big Five traits may be too broad to predict leadership criteria (i.e., leadership emergence and effectiveness), therefore potentially masking relationships between personality traits and leadership. On the other hand, the Big Five might include traits not covered by positive self-image typology such as Agreeableness and Openness to experience. This is important because broader personality traits will have higher predictive validity than narrower ones (Ones and Viswesvaran, 1996). Extending the logic of Caliendo, Fossen and Kritikos' (2011) research, it is expected that considering the Big Five and positive self-image can provide in-depth understanding of senior managers' attitude toward MIS implementation. This is because each of the taxonomies might partially predict senior managers' attitude and combining them together may be a stronger predictor of attitude.

Secondly, emotional stability/neuroticism is one of the indicators of positive self-image which creates a considerable overlap between positive self-image and the Big Five. Evidence suggest that locus of control (difference in an individual's belief in internal as opposed to external forces controlling the outcome of events in his life (Rotter, 1966)) and self-esteem which are two of the measures of positive self-image in CSE indicate the same aspect as Neuroticism (Judge *et al.*, 1998). Furthermore, according to Judge *et al.* (2003), positive self-image could be partially related to extraversion, neuroticism, and conscientiousness that is to say extraverted, emotional stable and conscientious people have generally a more positive self-beliefs. Managers generally score higher on E, C, and low on N than other populations (i.e., employees, students, nonfounders (e.g., heirs) (Zhao and Seibert, 2006; Antoncic *et al.*, 2018). As such, senior managers are more likely to score high on positive self-image. However, there needs to further examination of the relationship between the Big Five and positive self-image. There is evidence in the literature that personality traits such as the Big Five and positive self-image can influence a wide range of behaviour and outcomes, including managers' tendency in making decisions to introduce new IS into their firm (Marcati, Guido and Peluso, 2008; Wang *et al.*, 2016). In their empirical study, Marcati, Guido and Peluso (Marcati, Guido and Peluso, 2008) examined the relationship between the Big Five and SME

entrepreneurs' innovativeness (i.e. general innovativeness (GI) and specific innovativeness (SI)). GI refers to individuals' cognitive style, that is, the way they process information, make decisions and solve problems which then determines the degree of their openness and creativity (Foxall, 1995). SI refers to an individuals' tendency to be among the firsts to adopt innovations in a specific area (Goldsmith and Hofacker, 1991). Marcati, Guido and Peluso (Marcati, Guido and Peluso, 2008) found that O has the highest positive correlation with GI and SI while C has the highest negative correlation with GI and SI. GI indicated individuals' cognitive style and has no or little direct impact on the behavioural intention. Whereas, SI is a key factor in the formation of SME entrepreneurs' intentions and mediates the relationship between GI and SME entrepreneurs' intentions to adopt innovation. SME entrepreneurs with different predispositions to innovativeness (both GI and SI) were observed to have different personality profiles. There are two cognitive styles, adaptive and creative, people who tend to do things in line with existing rules and people who do things differently also called innovators (Foxall, 1995). According to Marcati, Guido and Peluso (Marcati, Guido and Peluso, 2008), entrepreneurs score high on O and low on C have a creative cognitive style. Furthermore, they are more extroverted and emotionally stable. The evidence presented suggests that senior managers with a creative cognitive style are more likely to implement MIS in their organisations. It is now well established that individuals' personality traits have an impact on their behaviours. However, the influence of personality traits on senior managers' decision to implement MIS has remained unclear. From an application point of view, organisations may use personality traits (i.e. the Big Five and positive self-image) as a tool to select their senior managers to increase the chance of successful MIS implementation. A successful implementation will help organisations to save money and manage their resources better. Methodologically, the findings might suggest a more effective way to predict senior managers' attitude toward MIS implementation. Although the Big Five have been widely used to predict individuals' attitudes and behaviours in management and psychology research, it has largely been ignored in the MIS field. This may enhance the predictive power of UET model. None of the earlier studies looked simultaneously for the effect of positive self-image and the Big Five in this context. Therefore, the present study set out to investigate whether senior managers differences in positive self-image, as operationalized through CSE, account for a variance in their attitude toward MIS implementation independently of established traits, and whether CSE may explain the effects of personality traits on attitude. Therefore, the third research question is as follow,

RQ3: Could the relationship between positive self-image and senior managers' attitude toward MIS implementation be explained by any personality traits in the Big Five?

The hypotheses

To address the third research question, two hypotheses were generated.

Debicki *et al.* (2016) investigated the relationship between positive self-image (operationalised by CSE) and academic performance on 307 students. They found that CSE provides an additional explanation regarding the variance in academic performance even after controlling for the Big Five. Their findings illustrate that there are additional factors such as CSE that predict academic performance beyond some of the factors in the Big Five. In the same vein, CSE is found to be a predictor of performance, controlling for the entire Big Five traits as a set (Judge *et al.*, 2003) or Conscientiousness (Erez and Judge, 2001). (Avery, 2003). In their meta-analytical study, Ng, Sorensen and Eby (2006) showed that locus of control which is one of the components of CSE has the same predictive power for some commonly examined work outcomes such as task performance and job satisfaction as the Big Five. They also suggested that locus of control should be integrated into the Big Five personality research. These findings suggest that positive self-image may predict senior managers' attitude toward MIS implementation independently of the Big Five. Therefore, the 9th hypothesis is as follows,

Hypothesis 9: Positive self-image accounts for variance in senior managers' attitude toward MIS implementation independently of the Big Five.

Personality researchers propose that personality traits such as positive self-image are more malleable than core personality traits such as the Big Five. The former also called "surface characteristics" (Asendorpf and Van Aken, 2003), i.e., positive self-image components are highly impacted by life events, environment and context. Asendorpf and Van Aken (2003) suggest that it is possible that the Big Five impacts components of positive self-image, however it is also likely that positive self-image influence the Big Five. They further maintain that any influences that significant life events and environmental factors may have on the Big Five are likely to be mediated through change in specific components of positive self-image. Marsh *et al.* (2006) investigated the relationship between personality traits (i.e., the Big Five and self-image), psychological well-being (i.e., life satisfaction, and academic success in a large scale empirical study of 4,475 university students in Germany. They found that specific components of self-image explained much variance in academic success that could not be explained by the Big Five. Self-esteem, one of the components of self-image, was found to be significantly associated with the Big Five and well-

being factors. This is because an individual who has a high self-worth is more likely to record a higher score for life satisfaction. They proposed that the Big Five and self-image are each causes and effects of each other. They further maintained that causal impacts of the Big Five on individuals' behaviour are likely to be mediated by self-image. Therefore, they suggest that both self-concept and the Big Five should be taken into account as predictors of individuals' behaviour and thinking. In another study (Şahin and Çetin, 2017), the relationship between the Big Five and perceived stress with the mediating effect of general self-efficacy, one of the components of positive self-image, was examined. They showed that self-efficacy fully mediates the relationship between E and perceived stress. This is because an individual high in general self-efficacy is more likely to interpret a stressful situation as a challenge rather than a threat. A highly extraverted person tends to judge their capabilities of handling stress positively which reduces stress (Carver and Connor-Smith, 2010). Therefore, extraverted individuals report less perceived stress due to the stress-protective role of general self-efficacy. They also found a strong positive association between N and self-efficacy since individuals high in N are more likely to make negative self-appraisal because of their negative evaluation of events and experiences (Kotov *et al.*, 2010). Similarly, Ebstrup *et al.* (2011) demonstrated that the relationship between the Big Five and perceived stress is mediated by general self-efficacy. Together, these findings suggest that both the Big Five and positive self-image are likely to impact senior managers' attitude toward MIS implementation with components of self-image possibly mediating the relationship between the Big Five and a senior manager's attitude. Therefore, the 10th hypothesis is:

Hypothesis 10: Positive self-image mediates the relationship between the Big Five and senior managers' attitude toward MIS implementation.

The Big Five and MIS implementation

Over the last five decades, various studies have investigated the links between the Big Five and entrepreneurship (e.g., Zhao, Seibert and Lumpkin (2010), Caliendo, Fossen and Kritikos (2011), Ciavarella *et al.* (2004), Zhao and Seibert (2006)). In their influential meta-analysis review, Zhao and Seibert (2006) compared the personality traits of entrepreneurs and managers. They showed that entrepreneurs scored higher on Conscientiousness and Openness to Experience, while they scored lower on Neuroticism and Agreeableness than managers. They did not find any difference for Extraversion due to lack of relevant information in the primary studies. Entrepreneurs need to explore novel ideas while managers tend to follow established rules and policies within their organisation which explains the reason that managers

score less on Openness than entrepreneurs. Entrepreneurs scored higher on C because they are more motivated for achievement and more dependable in fulfilling their commitments. The reason that managers score higher on N is that entrepreneurs experience more financial risk when starting a new business thus they experience more stress than managers. Furthermore, entrepreneurs may experience less negative repercussions related to their opportunistic behaviour while managers might incur serious consequences from their supervisors and colleagues. Therefore, they score higher than entrepreneurs on Agreeableness. Zhao and Seibert (2006) define an entrepreneur as an individual who founds, owns and manages a small business and whose main purpose is growth. According to the Theory of Need for Achievement in the seminal work of McClelland (1961) entrepreneurs and managers have more traits in common than with other types of work positions and the general population due to their similar types of challenges and work settings and since both entrepreneurs and business managers experience work environments which change rapidly. The literature (e.g., McClelland (1961), Collins, Hanges and Locke (2004)) identified some top level managers as entrepreneurs. Since the majority of UK manufacturers are SMEs (Department for Business Innovation and Skills, 2020), it is likely that their board level senior managers are either entrepreneurs or individuals who exhibit entrepreneurial traits.

Building upon Zhao and Seibert's (2006) approach, in their meta-analytical study, Rauch and Frese (2007) compared entrepreneurs with managers and 'other populations' (i.e., employees, students, nonfounders (e.g., heirs)) in specifically personality characteristics that are matched to entrepreneurs' task (i.e., tasks of running a business such as detect and exploit opportunities and making fast decision under uncertainty). They found that entrepreneurs score higher than managers in innovativeness, proactive personality, generalised self-efficacy, stress tolerance, and need for autonomy. Innovativeness indicates an individual's willingness to look for new ways of working which helps entrepreneurs to encourage innovations in their ventures (Heunks, 1998). Proactive personality assumes a person's willingness to influence their environment and by definition entrepreneurs tend to be self-starting and impact their environment by establishing new firms (Frese and Fay, 2001). Entrepreneurs score high on generalised self-efficacy since they must believe in their capabilities to deal with uncertain situations (Baum and Locke, 2004). Also, entrepreneurs should have high stress tolerance to cope with their weighty workload and the financial and personal risks that they take. Entrepreneurs prefer to make decisions independent of supervisors so they tend to have a high need for autonomy which enables them to be in control and be free of the rules of established organisations (Cromie, 2000). Managers score higher in locus of control as it may be even more crucial for them. Internal locus of control is defined as one's belief that they determine future outcomes through their own actions and people with external locus of control believe

that future outcomes are determined randomly or by the external environment (Caliendo, Fossen and Kritikos, 2011). It is important for both entrepreneurs and managers to believe that success or failure of their actions are determined by their own actions. The findings of these studies suggest that senior managers who have the same personality traits as entrepreneurs may have a more positive attitude toward MIS implementation. In the UK, the majority of manufacturers are SMEs (Department for Business Innovation and Skills, 2020) which might mean they have limited access to financial resources. This in turn increases the risks involved with MIS implementation for this sector since it is costly. Therefore, a senior manager who decides to implement such systems may need to have personality traits of an entrepreneur such as high stress tolerance, generalised self-efficacy, and Conscientiousness.

Collins, Hanges and Locke's (2004) meta-analytical findings of studies that involved achievement motivation and entrepreneurship indicate that achievement motivation is significantly associated with entrepreneurial career choice and performance. This is because the entrepreneurial setting is more likely to facilitate the potential to obtain more achievement satisfaction than other types of positions through providing challenge, autonomy and flexibility for achievement recognition (Collins, Hanges and Locke, 2004). Therefore, an individual with a high need for achievement is more likely to be attracted to entrepreneurship. Collins, Hanges and Locke (2004) however fail to draw a distinction between entrepreneurs and managers. That is to say, they did not require venture ownership, which is a common minimum requirement to operationalise an entrepreneur, in their definition of entrepreneurs resulting in having people who are not managers in their sample. This may limit accurate determination of differences between entrepreneurs and managers. Stewart and Roth (2007) defined an entrepreneur as an individual who independently owns and actively manages a small business. Building on Collins, Hanges and Locke's (2004) work, Stewart and Roth (2007) conducted a meta-analysis of studies that differentiate the achievement motivation of entrepreneurs and managers. They concluded that entrepreneurs score higher on achievement motivation than managers. This is important because it shows that the challenges of creating a new business, arranging the resources to create it, and organising its operations are more likely to activate achievement-oriented behaviour than routine tasks which results in attracting very motivated individuals to entrepreneurial positions. Therefore, it is more likely for a senior manager who possesses similar entrepreneurial characteristics to be motivated to get involved in challenging tasks such as implementing MIS. Their findings are in line with findings of Zhao and Seibert (2006) that showed entrepreneurs score higher on C since achievement motivations is one of the primary dimensions of C (McClelland, 1961). While the achievement aspect of C may be positively associated with entrepreneurial intentions and performance, other aspects such as respect for traditional norms may even be negatively

related to entrepreneurial success (Zhao, Seibert and Lumpkin, 2010). This is because individuals with strict social norms tend to be more conventional and cautious and avoid risk which may impact their success (Roberts *et al.*, 2005). This is important because achievement for motivation and strict social norms, which are both aspects of C, might cancel the effects of each other. Although MIS implementation is challenging, it has high potential for profit (Chatti, Radouche and Asfoura, 2021) which might provide context for highly achievement-motivated senior managers to have a more positive attitude toward MIS implementation.

Zhao, Seibert and Lumpkin (2010) investigated the impact of the Big Five and risk propensity as a sixth dimension on entrepreneurial intentions and firm performance (i.e., firm survival, growth, and profitability). They found that four of the Big Five personality dimensions including N, E, O and C are related to entrepreneurial intentions and performance. E, O and C are positively related to entrepreneurial firm performance. C is found to be positively associated with entrepreneurial intentions because people with high score on C are more attracted to jobs that give them opportunity to achieve their goals through their own efforts. Entrepreneurs score high on O as they are creative and open to innovations. Thus, they seek more information regarding their competitors and identify new market trends which allows them to perform better. Entrepreneurs are low in N as they are more likely to want to take on personal responsibilities and high stress related to activities in their role, consequently, they tend to perform better under stress. Risk propensity was found to be positively related to entrepreneurial intentions but not related to entrepreneurial performance. Individuals who score high on risk propensity tend to engage in decisions or activities involving uncertainty regarding success or failure consequences (Jackson, 1994). Risk taking is an important trait associated with entrepreneurs, therefore, people who score high on risk propensity are found to be more attracted to entrepreneurship. The majority of UK manufacturers are SMEs (Department for Business Innovation and Skills, 2020) which often have limited access to financial resources (Del Vecchio *et al.*, 2018). Implementing MIS is challenging and costly in terms of time and expenses which deems it to be at serious risk of failure (Chatti, Radouche and Asfoura, 2021), thus a senior manager with high risk propensity and low N are more likely to have a more positive attitude toward MIS implementation in their organisations.

In the same vein, Ciavarella *et al.* (2004) investigated the relationship of the Big Five and entrepreneur's success (i.e., new venture survival). They concluded that out of five traits only C is positively related to new venture survival which suggests that being hardworking and persistent are crucial for long-term venture survival and overall firm life span. Surprisingly, O is found to be negatively related to long-term new venture survival (Ciavarella *et al.*, 2004). A likely explanation is that individuals who are unwilling to

take the venture in a variety of opportunistic directions are more likely to survive in the long-term. Ciavarella *et al.* (2004) mention that entrepreneurs who score high on C and low on O are more likely to develop a managerial mindset and keep the operations of their venture stable. This is because a conscientious attitude (being persevering and well organised) increases sales, efficiency and effectiveness of the venture (Timmons, 1989). Entrepreneurs who score low in O are more likely to follow familiar paths which reduce uncertainty (George and Zhou, 2001). Therefore, having a conscientious attitude and not being open to a variety of opportunities appear to increase the long-term survival of a venture. However, Ciavarella *et al.* (2004) did not find any relationship between N, E and A and new venture long-term survival. A possible explanation for this contradiction in their findings and Zhao, Seibert and Lumpkin's (2010) results is that Zhao, Seibert and Lumpkin's (2010) study is meta-analytical and includes studies in their analysis of ventures at different stages of development which may cause variability in the findings of these studies. The findings from these studies suggest that the Big Five may predict a senior manager's attitude toward MIS implementation in UK organisations. UK manufacturing organisations are either at relatively early stages of MIS implementation (The Manufacturer, 2019) or may already have a MIS but need to change their current MIS because it no longer meets their needs (The Manufacturer, 2021b). Therefore, senior managers who are low in O and high in C may show unwillingness to implementing a new MIS in their organisation and prefer to keep their operations as it is.

The majority of studies focus on the relationship between the Big Five and the probability that an individual will become an entrepreneur, or the differences between managers and entrepreneurs. However, a broader perspective has been adopted by Caliendo, Fossen and Kritikos (2011) whose empirical study which investigates the impact of other independent personality traits that are not included in the Big Five such as locus of control and trust as well as the Big Five on entrepreneurship. They demonstrate that O, E and locus of control are positively related to becoming self-employed and entrepreneur, while N is negatively associated with entry to self-employment and entrepreneurship. People who score high on E tend to be sociable which enables them to develop social networks and therefore develop stronger partnerships with clients and suppliers. Consequently, they may more tend to become self-employed and entrepreneur. Individuals who score high on O tend to be more creative and innovative which are important attributes when you start a new venture and become entrepreneurs. Individuals who believe that future outcomes are determined through their actions are high in internal locus of control which increases the probability that they will become entrepreneurs. Entrepreneurship involves high amounts of stress and uncertainty, therefore an individual who scores low in N (high in emotional stability) is more likely to bear uncertainty and be stress resistant, thus is more likely to become

an entrepreneur. Caliendo, Fossen and Kritikos (2011) compared self-employed people with the remainder of population and in line with Zhao and Seibert's (2006) findings, they found that self-employed individuals score higher in O and E, and trust, while they score lower in A and N, and external locus of control. Self-employed people are also less patient, more impulsive and risk-tolerant than others. Similar to Zhao, Seibert and Lumpkin' (2010) finding, Caliendo, Fossen and Kritikos (2011) found that A has no significant impact on becoming an entrepreneur. This is because A has contradicting effects on entrepreneurial behaviour which cancel each other out. That is to say, people score high on Agreeableness are more likely to become entrepreneurs (Ciavarella *et al.*, 2004), while high A has a negative impact on entrepreneur survival as it may hinder entrepreneurs' ability to make hard bargains (Zhao and Seibert, 2006). However, they did not find any significant impact from C on becoming an entrepreneur. They explained this as a result of two contradictory influences of need for achievement and being dutiful which are contained within the construct of C. People with a high desire for achievement are more likely to become successful entrepreneurs, while individuals who score high on dutifulness are expected to be less successful entrepreneurs (see Rauch and Frese (2007)). Caliendo, Fossen and Kritikos (2011) concluded that the Big Five only partially explains an individual's decision to become an entrepreneur. The evidence reviewed here seems to suggest that the Big Five may partially predict senior managers' attitude toward MIS implementation but in order to fully understand the impact of personality traits on the attitude, one may need to include other independent personality traits such as positive self-image.

Studies such as that conducted by Barrick and Mount (1991) have shown that various aspects of the Big Five are associated with employee job performance. Their meta-analytical studies might contain a potential threat to construct validity due to including studies that used measures that were not specifically designed to measure the Big Five. It has raised some concerns over the validity of their results due to inaccurate estimations of the true relationship between the Big Five and job performance. To address this methodological deficiency, Hurtz and Donovan (2000) conducted a meta-analytical study in which actual measures of the Big Five were used as predictors of job performance. A was not found to be a predictor of job performance for managers or sales workers sales (Hurtz and Donovan, 2000; Barrick and Mount, 1991). N has a small but consistent impact on job performance. E is found to be a valid predictor of job performance for managers and sales workers. C has been found to be a consistent predictor of job performance across jobs including management and sales (Hurtz and Donovan, 2000; Barrick and Mount, 1991). Individuals who score high in C are more likely to perform better. Their findings highlight the importance of personality traits on job performance, they also suggest that organisations can use the Big Five as a tool to select their personnel. Similarly, in their meta-analytical study, Ones *et al.* (2007) found

that the Big Five personality traits as a set predict organisational behaviours including leadership and job performance with the effect size of moderate to strong (0.2 to 0.5). They suggest that self-report personality scales can be used in organisational decision making including personnel selection. Just as the Big Five has provided a beneficial taxonomy for the study of job performance, so it might for the study of senior managers' attitude.

Judge, Bono, *et al.*'s (2002) meta-analytical findings of studies on the personality and leadership relationship suggest that E is the most important trait of leaders since individuals that are both sociable and dominant tend to assert themselves more in group settings which allows them to emerge as leaders. C and O are found to have the next strongest and most consistent correlation with leadership. Conscientious individuals tend to be involved in organising activities such as note taking and facilitating processes which may allow them to emerge as leaders quickly. Openness is strongly associated with behavioural measures of creativity which appears to be a crucial skill of effective leaders (McCrae and Costa, 1997). Therefore, individuals who score high in Openness are more likely to emerge as leaders. Although the mean correlation of N was not zero, it failed to predict leadership significantly in multivariate analysis which might be because it shows the highest average correlation with other Big Five traits. One of the main limitations of Judge, Bono, *et al.*'s (2002) study is that the studies included in their meta-analysis might not consider the emergence of possible moderator effects affecting the lower order traits. That is to say, lower order traits such as dominance and sociability as lower order traits of E in the Big Five may be related to leadership differently across different study settings (i.e., student, business, military, and government setting). For example, dominance might have a stronger relationship to leadership in student settings than in government settings where individuals are more bounded by rules. That is, studies involving situations with few rules e.g., emergence of a leader in teams of students in a psychology class at university may result in the studies being better able to predict student leadership by the Big Five. Furthermore, House, Shane and Herold (1996) mentioned that dispositional forces such as the Big Five are more powerful in weak situations (i.e., relatively unstructured situations with few rules or formally defined roles). For example, military organisations which are rule oriented might suppress dispositional effects. This indicates that lower order traits in the Big Five might be affected by organisational settings of UK manufacturers which are business settings and according to Judge *et al.* (2002) situated somewhat in between of student setting and government or military settings.

Aronson, Reilly and Lynn (2006) empirically examined the impact of leader personality on new product development (NPD) project performance under different levels of uncertainty. They found that leader personality impacts project performance differently when there are different levels of uncertainty during

a project. For example, O would have a stronger impact on NPD performance when uncertainty was high, while E, C, and N would have a stronger indirect impact on NPD performance through teamwork under low level of uncertainty. Milliken (1987) defines uncertainty as individuals' perceived inability to completely understand or predict something e.g., the outcomes of a decision. According to Ali and Miller (2017) too many organisations face failure implementing ERP, and many others are afraid of implementation due to expenses and lack of reliable information on advantages and disadvantages of implementation. This suggests that implementing MIS involves a high levels of uncertainty which may result in a greater impact of senior managers' personality traits on their attitude toward MIS implementation. This suggests a need to investigate the links between a senior manager's personality traits and their attitude.

Antoncic *et al.* (2018) investigated the Big Five personality traits of SMEs' managers in Slovenia and their company performance (i.e., growth, profitability and new value creation). They found that O, N, and E are positively associated with firm performance. Openness is a crucial factor in helping SMEs' managers to recognise opportunities which is positively related to firm growth. They suggested that neurotic traits of SME managers such as envy and jealousy could be motivating in achieving superior performance in terms of growth and profitability. An extraverted senior manager's company grows fast since they better exploit opportunities. This is because individuals who score high on E are better communicators enabling them to more easily establish contacts with business partners and integrate their business into corporate networks which positively impact firm performance. Since the majority of UK manufacturers are SMEs, it is plausible that the Big Five personality traits of their senior managers may impact their decision to implement MIS in their organisations. That is, MIS implementation can positively impact firm efficiency and profitability (Charamis, 2018). In sum, considerable theory and empirical research suggest that personality constructs should be viewed as an important determinant of individuals' attitude.

Therefore, the fourth research question is,

RQ4: Could any personality traits in Big Five directly affect senior managers' attitude toward MIS implementation?

Table 4: Studies examining personality traits of individuals (i.e., the Big Five and positive self-image), N=Neuroticism, E=Extraversion, O=Openness, A=Agreeableness, C=Conscientiousness

Authors	Sample size	Sample characteristics	Methodology	Findings
Zhao and Seibert (2006)	23	Studies comparing entrepreneurs and managers on one or more psychological traits	Empirical (meta-analysis)	<ul style="list-style-type: none"> • Entrepreneurs scored higher on Conscientiousness and Openness to Experience than managers • Entrepreneurs score lower on Neuroticism and Agreeableness than managers. • No difference for Extraversion
Zhao, Seibert and Lumpkin (2010)	60	studies that reported the relationships between psychological traits and entrepreneurial intentions and entrepreneurial performance	Empirical (meta-analysis)	<ul style="list-style-type: none"> • four of the Big Five personality dimensions including N, E, O and C are related to entrepreneurial intentions and performance • A is not associated with entrepreneurial intentions and performance • Risk propensity positively related to entrepreneurial intentions but not related to entrepreneurial performance
Caliendo, Fossen and Kritikos (2011)	unknown	German Socio-Economic Panel (SOEP) survey between 2000 to 2009	Empirical	<ul style="list-style-type: none"> • Openness, Extraversion, and locus of control are positively related to becoming self-employed and entrepreneur • N is negatively associated with entry to self-employed and entrepreneurship

Authors	Sample size	Sample characteristics	Methodology	Findings
Rauch and Frese (2007)	116	All studies that defined business owners as independent ownership and active management and had some measure of a personality trait and some measure of business success or business creation	Empirical (meta-analysis)	<ul style="list-style-type: none"> • Personality traits that are matched to the entrepreneurs' task can predict entrepreneurial behaviour better • Need for achievement, generalized self-efficacy, innovativeness, stress tolerance, need for autonomy, and proactive personality are significantly associated with entrepreneurial behaviour
Ciavarella <i>et al.</i> (2004)	111	Surveys of graduates of a large south eastern university (longitudinal over 18-23 years).	Empirical	<ul style="list-style-type: none"> • Entrepreneurs' C is positively associated with long-term venture survival • Entrepreneurs' O is negatively related to long-term venture survival • E, N and A are not related to long-term venture survival
Stewart and Roth (2007)	17	Studies that differentiate the achievement motivation of entrepreneurs and managers	Empirical (meta-analysis)	<ul style="list-style-type: none"> • Entrepreneurs score higher on achievement motivation than managers
Collins, Hanges and Locke (2004)	41	Studies that involved achievement motivation and entrepreneurship	Empirical (meta-analysis)	<ul style="list-style-type: none"> • Achievement motivation is significantly associated with entrepreneurial career choice and performance
Hurtz and Donovan (2000)	26	Studies involved the relation between the Big Five and job performance	Empirical (meta-analysis)	<ul style="list-style-type: none"> • A was not found to be a predictor of job performance for managers or sales workers • N has a small but consistent impact on job performance. • C is a valid predictor of job performance

Authors	Sample size	Sample characteristics	Methodology	Findings
				<ul style="list-style-type: none"> • E impacts job performance of sales and perhaps managerial jobs • O impact performance in customer service jobs
Barrick and Mount (1991)	117	Studies of personality between 1952 to 1988	Empirical (meta-analysis)	<ul style="list-style-type: none"> • C is a valid predictor of job performance • A is positively associated with job proficiency • E is found to be a valid predictor of job performance for managers and sales workers
Judge, Bono, <i>et al.</i> (2002)	73	Studies on the personality and leadership relationship	Conceptual and Empirical	<ul style="list-style-type: none"> • E is the most consistent correlate of leadership across leader emergence and leadership effectiveness • Openness to Experience was not related to leadership in business settings • N was not the significant predictor of leadership • C had a significant impact on leadership
Derue <i>et al.</i> (2011)	59	Meta-analytical studies of leadership	Empirical (meta-analysis)	<ul style="list-style-type: none"> • Leader behaviours had a greater influence on leadership effectiveness criteria than leaders' personality traits (the Big Five) • C was the most important predictor of leadership effectiveness followed by A
Aronson, Reilly and Lynn (2006)	143	NPD projects in various technology-based companies in the north-eastern U.S	Empirical	<ul style="list-style-type: none"> • E, C and N have a stronger indirect influence on new product development (NPD) performance through teamwork under low uncertainty • O has a stronger impact on teamwork and NPD performance when uncertainty was high

Authors	Sample size	Sample characteristics	Methodology	Findings
Antoncic <i>et al.</i> (2018)	422	Slovenian SMEs (83.8%, service industry and 16.2% in manufacturing)	Empirical	<ul style="list-style-type: none"> • Openess, N, and E of managers can predict growth and new value creation • C may not be crucial for performance (growth, profitability and new value creation) • A can have negative effects on all elemnts of performance
Marcati, Guido and Peluso (2008)	188	Italian entrepreneurs of SMEs belonging to different industries (food, construction, engineering, wholesale, and textile–clothing–footwear industries)	Empirical	<ul style="list-style-type: none"> • O has the highest positive correlation with general innovativeness (GI) and specific innovativeness (SI) • C has the highest negative correlation with GI and SI
Chamorro-Premuzic, Ahmetoglu and Furnham (2008)	388	US and UK university students	Empirical	<ul style="list-style-type: none"> • N has a stornq significant impact on Test Anxiety (TA) • E has a modest but significant direct effects on TA • In the presence of the Big Five, CSE no longer explained the variance in TA • There was a strong direct path from N to TA, as well as modest but significant direct effects of E on TA.

Hypotheses

Below possible linkages between personality and senior managers' attitude toward MIS implementation are considered. The specific hypotheses of the study are generated based on the defining features of each personality dimension.

Neuroticism (N)

Neuroticism is the opposite of emotional stability. It describes someone who is emotional, self-conscious, temperamental, worrying and impulsive (Costa and McCrae, 1992) while individuals with low N are calm, even tempered, self-satisfied, and comfortable. Neurotic people are more inclined to have more negative life experiences than others (Magnus *et al.*, 1993) and they are also more likely to become discouraged by small failures (Zhao, Seibert and Lumpkin, 2010). Individuals low in N are more likely to cope with high levels of stress through thinking more positively (Costa and McCrae, 1992). People who are pessimistic about the outcome of their efforts i.e., who have a higher level of N are more likely to impact the performance of their firm negatively. Individuals who are more confident and self-secure in undertaking risks and cope with uncertainties will probably be more successful in difficult conditions (Ciavarella *et al.*, 2004). There is evidence in the literature that emotionally stable individuals are more risk tolerant (Wong and Carducci, 2013; Oehler *et al.*, 2018). MIS implementation involves a high risk of failure (Ali and Miller, 2017) which results in a high level of uncertainty. Thus, it is expected that senior managers high in N may feel more apprehensive about implementing a new system in their organisation.

Hypothesis 11: N has a negative impact on senior managers' attitude toward MIS implementation.

Extraversion (E)

People who are extraverted are described as affectionate, talkative, active, passionate, and warm (Barrick and Mount, 1991; Costa and McCrae, 1992). Introverted people tend to spend more time alone and the adjectives used by Costa and McCrae (1992) to describe introverted individuals are passive, quiet, and reserved. According to an interpretation by Hogan and Hogan (2007), E consists of two facets, ambition (initiative, ambition and surgency) and sociability (sociable and expressive). A person high on E is likely to interact more with a diverse range of business partners, venture capitalists, employees and customers which may have an impact on their understanding of the benefits of MIS implementation through these interactions and communications. This will supply their firm with information about an opportunity (benefits of MIS implementation) which is a unique firm resource (Barney, 1991). Being better informed

would make it possible for a firm to implement MIS before others. UK manufacturers are at relatively early stages of MIS implementation (The Manufacturer, 2021b), thus it is likely that a firm with a senior manager high in E will become aware of the benefits of MIS implementation earlier than its competitors and exploit the opportunity. MIS implementation can make companies more efficient and profitable which helps them to sustain their competitive advantage (Jafari and Nair, 2018).

Extraverted individuals are more likely to be dominant, competitive and aggressive (Zahra *et al.*, 2007). This competitive aggressiveness can be reflected in a company's operations leading to a company's growth (Antoncic *et al.*, 2018). However, in the long term, too much competitive aggressiveness might not lead to profitability. Individuals who score high in E are generally more risk-tolerant (Wong and Carducci, 2013), therefore extraverted senior managers are more likely than introverted senior managers to show a more positive attitude toward MIS implementation which involves high levels of risks and uncertainty.

Hypothesis 12: E has a positive impact on senior managers' attitude toward MIS implementation.

Openness to experience (O)

Individuals with a high score on Openness to experience are curious, imaginative, creative, original and they prefer variety rather than routine (Costa and McCrae, 1992). They also tend to look for novel ideas and new experiences. Someone low on Openness can be characterised as conventional, down to earth, uncurious and conservative. Barrick and Mount (1991) suggest that individuals who score high in O are more likely to have a positive attitude toward new experiences. In the same vein, Zhao, Seibert and Lumpkin's (2010) meta-analytical findings show that successful entrepreneurs score high on O and are therefore more likely to seek information about market trends, competitor behaviours and new technologies. Ciavarella *et al.* (2004) point out that being ready for technological changes is crucial for an entrepreneur's survival. The constancy of change in markets, products, and technology requires Intelligence and curiosity which enables entrepreneurs to seek for new knowledge of technological developments to develop new strategies to benefit from available sources of revenues. While the subjects for these studies were not senior managers, the results can be applicable to senior managers since being open to new technologies is vital to the survival of all organisations. Lounsbury and Gibson (2002) found that Openness is related to willingness to change, test new procedures and desire to achieve results and Caligiuri (2000) showed that Openness is mostly associated with innovativeness. There is evidence in the literature that managers' innovativeness is positively related to their intention to implement business

intelligence systems in their organisations (Wang, 2014). According to Marcati, Guido and Peluso (Marcati, Guido and Peluso, 2008), entrepreneurs' innovativeness plays a key role in the implementation of innovations in SMEs. Therefore, since the majority of UK manufacturers are SMEs (Department for Business Innovation and Skills, 2020), a senior manager who scores high on Openness is more likely to implement MIS in their firms. Aronson, Reilly and Lynn's (2006) findings suggested that under high levels of uncertainty, a leader's openness had a significant positive impact on new products development project performance. This is because open leaders are more creative in connecting their firms' technological competencies and strategies with market needs to create an effective product (Brown and Eisenhardt, 1995). Moreover, they are open to information from their customers and more effective in helping their team to focus the development of new products in line with the customers' needs. MIS implementation also involves high levels of uncertainty, therefore, senior managers scoring high in O are more likely to be creative in connecting their current firm technological strategies with market needs thus sustaining their competitive advantage. As mentioned earlier, MIS facilitates strategic alignment of manufacturers' marketing and operations which allows them to respond to market needs. Moreover, MIS implementation can increase profitability and efficiency of manufacturing firms (Charamis, 2018). UK manufacturing organisations are either at relatively early stages of MIS implementation (The Manufacturer, 2019) or some of them who already have a MIS are needing to change their current MIS because it no longer meets their needs (The Manufacturer, 2021b). Therefore, senior managers at UK manufacturing organisations who score high in O are more likely to show willingness to change their existing system to a new system and become more efficient and profitable.

As such, it is expected that senior managers high in O may have a more positive attitude toward implementing MIS in their organisations.

Hypothesis 13: O has a positive impact on senior managers' attitude toward MIS implementation.

Agreeableness (A)

Agreeableness is an aspect of interpersonal behaviour which is identified with modesty, trust, straightforwardness, alternance and compliance (Costa and McCrae, 1992). Agreeableness has an impact on self-image and helps to form an individual's social attitude and life philosophy (Costa, McCrae and Dye, 1991). People with high A are mild natured and defer to others in conflicts and they also tend to be selfless and concerned for others, while people with low A tend to put their own interests and needs before others and hold their own in conflicts with others (Costa and McCrae, 1992). McClelland and Boyatzis (1982)

proposed that affiliation, a component of A, can damage managers' careers. They showed that managers low in affiliation are able to make difficult decisions without worrying excessively about being disliked. Affiliation hinders managers' ability to make challenging decisions which impacts on their employees and colleagues. Antoncic *et al.* (2018) found that an SME manager with high levels of A has a negative impact on company performance in terms of growth and profitability. This can be explained as SME managers' having high levels of A may inhibit their willingness to look out for their own self-interest and drive hard bargain which may result in giving in to competitors and business partners' demands thus losing their competitive advantage. They further maintain that SME managers high in A are not aggressive enough in the competitive market, i.e., they may be willing to emphasise the benefits of other firms rather than highlighting their own firm. MIS implementation is expensive in terms of time and costs and a high risk decision, due to the high possibility of failure and high level of uncertainties it involves (Chatti, Radouche and Asfoura, 2021). A senior manager high in A is more likely to avoid making a decision to implement MIS in their organisations since they might find the decision too challenging because of the possibility of it having a significant negative impact on their employees and colleagues. MIS helps firms to gain a competitive advantage (Galliers and Currie, 2011) and a highly agreeable senior manager may not be aggressive enough in the market to implement MIS earlier than their competitors to gain that competitive advantage. As such, it is plausible that senior managers high in A are more likely to have a negative attitude toward implementing a new MIS system.

Hypothesis 14: A has a negative impact on senior managers' attitude toward MIS implementation.

Conscientiousness (C)

Conscientiousness describes an individual who is ambitious, hardworking, dutiful, well-organised, punctual, and competent (Zhao, Seibert and Lumpkin, 2010). People with high C tend to be sensible and accomplished and strictly adhere to standards of conduct, while people with low C are inclined to procrastination and easily give up when they are frustrated (Zhao, Seibert and Lumpkin, 2010). Other researchers (e.g., Mount and Barrick (1995)) suggest that C is composed of two primary aspects: achievement motivation and dependability. Individuals with high need for achievement prefer situations in which their performance is due to their own efforts rather than other variables and they face slight risk of failure (McClelland, 1961). Individuals with high need for achievement are more likely to engage in innovation activities where they are responsible for the outcomes since they are predominantly success-oriented and their satisfaction comes from personal accomplishment, while people with a low need for

achievement are more concerned about having feelings of failure (McClelland *et al.*, 1958). McClelland (1961) proposed that individuals with a high need for achievement are more likely to be attracted to entrepreneurial jobs. This is because they prefer tasks that provide clear performance feedback and have a moderate risk or challenge. He also suggested that entrepreneurial roles involve more of these characteristics than other type of roles. However, entrepreneurs tend to display risk aversion in facing uncertainty associated to market demand, while they show overconfidence when faced with uncertainty regarding their own entrepreneurial ability (Wu and Knott, 2006). MIS implementation involves high levels of uncertainty due to the high risk of failure and the lack of reliable information on the pros and cons of implementation (Ali and Miller, 2017). The dependability aspect of C is characterised by an individual who is reliable, organised, responsible, careful, and deliberate (Zhao and Seibert, 2006). A senior manager who scores high in C is more likely to have a less positive attitude toward MIS implementation because they are more concerned about failure according to the achievement motivation aspect of C and also they are more dependable in fulfilling their commitments regarding the success of MIS implementation.

Hypothesis 15: C has a negative impact on senior managers' attitude toward MIS implementation

Summary of hypotheses

Based on the literature review, twelve hypotheses were developed to address the first two research questions. To address Research Question 1, which concerns the impact of the key influences of demographic characteristics of senior managers and their personality traits on their attitude toward MIS implementation, H1 to H6 were generated. Age and tenure were proposed to negatively relate to attitude while career variety, education, involvement in IS projects, and positive self-image were proposed to positively relate to attitude. Research Question 2, which concerns the mediating role of attitude in the relationship between age, career variety, tenure, education, involvement in IS projects, positive self-image and senior managers' support, is addressed by H7a to H8. To address the third research question, two hypotheses were generated. Five hypotheses were generated to address the fourth research question.

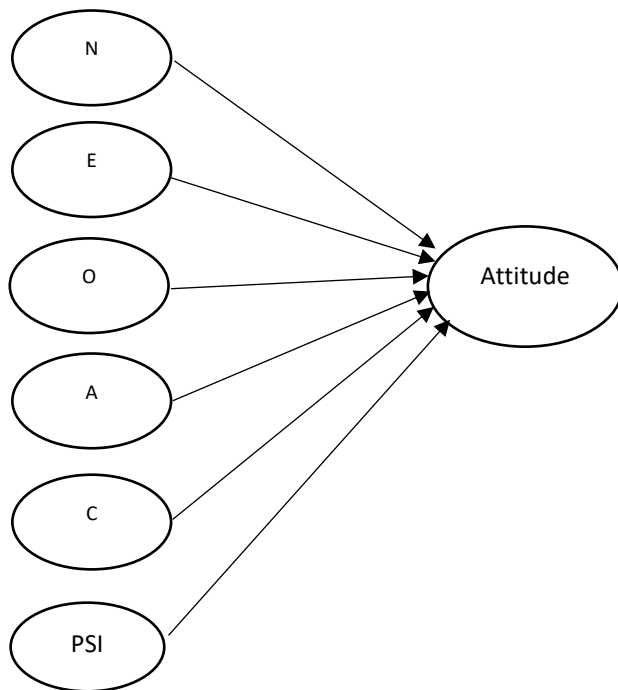


Figure 2: N= Neuroticism; E= Extraversion; O= Openness to experience; A= Agreeableness; C= Conscientiousness; PSI= positive self-image; Attitude= senior managers' attitude toward MIS implementation

Methodological overview

The present study employs a mixed-method approach combining quantitative and qualitative findings to gather numerical and textual data about senior managers' decision to implement MIS in the UK manufacturing sector, then integrate these forms of data to produce results. A mixed-method approach not only expands the breadth of the study to offset the weaknesses of either approach alone (Creswell *et al.*, 2003), but also it can provide pragmatic benefits when exploring complex research questions (Driscoll *et al.*, 2007). A sequential mixed methods data collection strategy was chosen to provide more data about results from the earlier phase of data collection and analysis. This strategy helps to generalise findings by verifying and enhancing results (Creswell and Clark, 2007). In this sequential design, quantitative data was collected first and statistical methods were employed to determine which findings to augment in the next phase. Statistical analysis can provide a detailed evaluation of patterns of responses and the qualitative data can provide a deeper understanding of the survey responses.

The flexible and iterative data collection strategy in this study consisted of three data collection phases. In the first phase, survey data was collected; in the second phase, data was gathered from in-depth interviews, followed by the third phase of survey data collection. The survey questions in the first phase were closed, followed by an open-ended question at the end. The subsequent in-depth semi-structured interview consisted of questions intended to explore senior managers' perception and attitude toward MIS implementation, their perception of themselves as well as including questions exploring their position on their future plans for MIS implementation. The interview protocol will be discussed in detail in Chapter 4. The survey questions in the third phase were entirely close-ended. This three-phased approach allowed senior managers to respond to the survey in their own time and reduced the time required for in-depth discussions of emergent themes. It provided the researcher with the opportunity to review and analyse the first survey findings and tailor the following in-depth interview instrument to follow-up on significant results.

Analysis was based on the conceptual framework called the Upper Echelon Theory proposed by Hambrick and Mason (1984) in which they proposed that senior managers make their decisions based on their past experiences, beliefs, and personality traits. They further explain that these past experiences and beliefs could be measured through senior managers' demographic characteristics (including age, tenure, education background, and career variety) and personality traits. The majority of UK manufacturers are SMEs and it is board level senior managers who will make the decision to implement MIS in their

organisations. Therefore, the primary inclusion criteria for the participants was being a board level senior manager of a UK manufacturing organisation.

There are a number of tools available for measuring personality traits including the Big Five, positive self-image (using Core Self-Evaluation scale (CSES) proposed by Judge et al. (2002)), self-esteem, locus of control, self-efficacy, etc. A major limitation of traditional tools to measure personality traits is that they are lengthy. CSES was chosen for two main reasons. Firstly, the validity of the scale has been endorsed in the literature (e.g., Gardner and Pierce, 2010). Secondly, it is short, consisting of 12-items on a Likert scale which reduces the time taken to complete the questionnaire. A major obstacle of recruiting board level senior managers to participate in surveys is time (Gardner and Pierce, 2010) so reducing the average time taken to respond to a survey increases the chances of this specific group of participants filling out the survey. Secondly, the literature (e.g., Judge et al. 2003) suggests that it has similar effect size compared to other well-established measures such as the Big Five, which consisting of at least 44-items on a Likert scale which greatly increases the length of the questionnaire. To measure senior managers' attitude toward MIS implementation and their support, questions were answered using a Likert scale.

The findings of the first study showed that personality traits of senior managers have a very significant impact on their attitude toward MIS implementation which took the direction of the study toward adopting a psychological approach. Therefore, in the second study, it was decided to employ a qualitative method in order to gain more insightful in-depth data. Interviews are one of the most widely used data collection methods in qualitative psychology research (Howitt, 2016). Semi-structured interviews were conducted with 12 board level senior managers from UK manufacturing organisations. The majority of interviewees alluded to elements of the Big Five when they talked about how they perceive themselves as a manager and how their colleagues perceive them as a manager. This raised the question of the Big Five being used as a measure to assess senior managers' personality traits. In the third phase of this study, a survey method was employed to ascertain which measure to use to assess senior managers' personality traits.

Chapter 3: Study 1

Introduction

Study 1 addresses the Research Question 1 and Research Question 2. The objective of Research Question 1 is to investigate the impact factors that contribute to a senior manager's attitude. Age, career variety, tenure, education, involvement in IS projects, and positive self-image were examined as the contributing factors of a senior managers attitude. Six hypotheses (H1-H6) were generated to address RQ1. Six hypotheses (H7a-H7e and H8) were generated to address Research Question 2, which concerns the mediating role of senior managers' attitude.

In this chapter, the research framework that was used during the investigation in order to test the hypotheses is explained. The method that was adopted for the purpose of this investigation is discussed and the justification of why the selected method was used is provided. The design of the survey and its development are explained as well as how the questionnaires were distributed to the selected participants. A pre-test and a pilot study were also conducted to obtain feedback on the clarity of the questionnaires and determine if they required adjustment to direct the investigation. The questionnaires were developed using a 5-point Likert for the participants to indicate their level of agreement or disagreement with 21 statements relating to the aim of this investigation. Also in this chapter, the analysis and the findings of the data are presented.

Methods

Survey design

Pre-test and pilot study

This section looks into pre-test and pilot study of the survey designed for the first study to answer the first two research questions of this study. The purpose of this stage is to refine the survey items, pre-test the survey, revise statements, design the online survey, and pilot test the survey. Pre-testing and pilot testing is necessary to assess the reliability and validity of the survey items (Vaus, 2002). The survey items were revised based on the feedback from the pilot study. Pre-testing helps to check that questions work as intended and are understood by the respondents. It also helps to decrease sampling errors and increase response rates (Hilton, 2017). The survey was pilot tested with a small sample of the target participants to verify the reliability of the constructs and identify issues (Hilton, 2017). The main purpose of pilot study was to assess if all the questions were clear and how long it took for participants to complete it.

Participants demographics

Pre-testing

The pre-test sample consisted of eight senior managers from UK manufacturing organisations who were familiar with information systems. 87.5 % of participants were male. 62.5% of participants were 35 to 44 years old and 62.5% of participants had a university first degree (see Table 5).

Table 5: Demographic characteristics of pre-test participants (N=8)

Demographic categories	Frequency	Percentage (%)
Gender		
Male	7	87.5%
Female	1	12.5%
Non-binary	0	0
Age		
18-24	0	0%
25-34	0	0%
35-44	5	62.5%
45-54	2	25%
55-64	1	12.5%
65+	0	0%
Education		
No formal qualification	0	0%
Diploma	0	0%
College degree	0	0%
University first degree	5	62.5%
Master's degree or higher	3	37.5%

Pilot test

The pilot study consisted of 27 senior managers from UK organisations which were selected from the population of firms operating in manufacturing industries. 63% of participants were male, 37 per cent were females. 59.25% of participants' age ranged from 35 to 44 years. 48.1% of participants had a masters' degree or higher (see Table 6). The manufacturing industry was chosen to recruit respondents because MIS plays a major role in coordinating business activities in this industry (Kebede and Bruwer, 2002).

Table 6: Demographic characteristics of pilot study participants (N=27)

Demographic categories	Frequency	Percentage (%)
Gender		
Male	17	63%
Female	10	37%
Non-binary	0	0
Age		
18-24	0	0%
25-34	5	18.5%
35-44	16	59.25%
45-54	5	18.5%
55-64	1	3.75%
65+	0	0%
Education		
No formal qualification	1	3.7%
Diploma	0	0%
College degree	3	11.1%
University first degree	10	37%
Master's degree or higher	13	48.1%

Measures

Survey development

Saunders, Lewis and Thornhill (2009) suggested two phases in developing a survey: phase one is survey initialisation: - extracting where key measures related to the constructs under investigation are identified from the literature, followed by phase two which involves pre-testing the survey and conducting a pilot study.

Survey Initialisation

In this stage, an initial pool of items explaining constructs of interest were obtained from existing measures in the literature. Following the suggestion of Oppenheim (2000), multi-item measures were

used to measure senior managers' positive self-image, attitude, and support to ensure the reliability and validity of items. Multi-item measures are defined as latent constructs that are measured by several indicators rather than a single-item measure that only has one indicator (Diamantopoulos *et al.*, 2012). However, to measure age, career variety, tenure, education, and prior involvement in IS projects, single-item measure was used. The scale and format of the measurements were taken into consideration.

Initial Item pool

The constructs identified as the independent variables are age, career variety, tenure, education, prior involvement in IS projects, and positive self-image. The constructs identified as dependent are senior managers' attitude and support toward MIS implementation. Constructs for the initial item pool in the literature are summarised in Table 7.

Table 7: Study Constructs; Education: senior managers' highest level of education

Construct	Definition	Items in original scale	Reference works
Age	The length of time that a CEO has lived (Wang et al., 2016).	1	Wang <i>et al.</i> (2016)
Career variety	Refers to senior managers' involvement in different industry sectors, firms, and functional areas (Crossland et al., 2014).	4	Crossland <i>et al.</i> (2014)
Tenure	Refers to the time spent by the manager at the workplace (Wang et al., 2016)	1	Wang <i>et al.</i> (2016)
Education	Refers to the level of education attainment by senior managers (Ahn, Minshall and Mortara, 2017).	7 ordinal scale 4	Lefebvre, Mason and Lefebvre (1997) Barzekar and Karami (2014)
Prior involvement in IS projects	Refers to senior managers' personal intervention in IS projects Jarvenpaa and Ives (1991).	4	Jarvenpaa and Ives (1991)
Positive self-image	A combination of various beliefs one holds about oneself (Seo, Shen and Benner, 2019).	12	Judge <i>et al.</i> (2002)
Senior managers' attitude toward MIS implementation	Refers to the extent that an individual appraises a behaviour (Ajzen and Fishbein, 1977).	4 4	Taylor and Todd (1995) Roumani, Nwankpa and Roumani (2017)
Senior managers' support toward MIS implementation	Committing time to the [IS] program in relation to its expense and potential, looking into plans, circling back to results and facilitating the administration issues (Young and Jordan, 2008).	2 3 7	Sanders and Courtney (1985) Swink (2000) Khan <i>et al.</i> (2013)

Measuring age, tenure, education, involvement in IS projects

Senior managers' age was operationalized as the length of time (e.g., years and months) a senior manager had lived when data were collected. Senior managers' tenure was operationalized as the length of time they had held the senior manager's position. Senior managers' education was operationalized as the senior managers highest level of education (no formal qualification, diploma, college degree, university first degree, masters' degree or higher). Senior managers' involvement in IS implementation projects was defined as the number of IS projects that they had been involved in during the implementation process.

Measuring senior managers' career variety

Four measure were used to measure senior managers' career variety. To measure career variety, the proposed formula by Crossland et al, (2014) was used, which is the sum of distinct industry sectors, distinct firms and distinct functional areas the individual had worked in prior to becoming CEO of the focal firm, divided by the number of years the person had worked prior to becoming CEO. Seven distinct job functions suggested by Cannella, Park and Lee (2008) were used. These job functions are production or operations; R&D or engineering; accounting or finance; marketing or sales; personnel or labour; relations or law.

Measuring senior managers' positive self-image

In this study, positive self-image refers to how an individual assesses himself and his relationship with the environment (Judge, Erez, *et al.*, 2002). To measure positive self-image, a 12-item measure that optimally taps the central Core Self-Evaluation (CSE) constructs developed by Judge et al. (2002) was used. Gardner and Pierce (2010) argued that this measure is better to use when participant's time is limited and because senior managers' time is really limited, the researcher chose this direct approach to measure CSE. The validity of this scale was confirmed by researchers (e.g., Gardner and Pierce, 2010). The 12-item measure was modified to make sure that it could distinguish between top managers with high CSE and those with very high CSE. The researcher followed the recommendation given for this by Hiller and Hambrick (2005). Some of the items were reworded to evaluate higher CESs more precisely. For instance, the item, 'When I try, I generally succeed' might be reworded as, 'When I try, I almost always succeed.' (See appendix B3-1 for a detailed explanation of changes.

Table 8: Items for measuring positive self-image adopted from Judge et al. (2002)

Items	
CSES1	I am <i>very</i> confident I get the success I deserve in life.
CSES2	Sometimes, I feel depressed (Reverse coded).
CSES3	Sometimes, when I fail, I feel worthless (Reverse coded).
CSES4	When I try, I almost always succeed.
CSES5	I complete tasks successfully.
CSES6	Sometimes, I do not feel in control of my work (Reverse coded).
CSES7	Overall, I am <i>really</i> satisfied with myself.
CSES8	I am filled with doubts about my competence (Reverse coded).
CSES9	I <i>almost always</i> determine what will happen in my life.
CSES10	I do not feel in control of my success in my career (Reverse coded).
CSES11	I am capable of coping with most of my problems
CSES12	There are times when things look pretty bleak and hopeless to me (Reverse coded).

Measuring senior managers' attitude

Senior managers' attitude refers to the extent that an individual appraises a behaviour (Ajzen and Fishbein, 1977). Senior managers' attitude was measured by Taylor and Todd (1995) and Roumani et al. (2017) using four items. However, in the pre-testing phase, eight participants who were experienced in MIS implementation commented that the statements were repetitive and needed to be altered (for a detailed description see *Instrument revision* section). The original statements were reworded, however, their repetitiveness was maintained in order to capture the nature of the constructs being measured (see Table 9).

Table 9: Items for measuring senior managers' attitude

Items	
A1	I do not see a value in MIS implementation (Reverse coded).
A2	The cost of MIS implementation outweighs the benefits (Reverse coded).
A3	Using MIS helps me to be more efficient and save time.
A4	Using MIS would be beneficial to both me and my firm.

Measuring Senior managers' support

Senior managers' support refers to committing time to the [IS] program in relation to its expense and potential, looking into plans, circling back to results and facilitating administration issues (Young and

Jordan, 2008). Senior managers' support was measured by Sanders and Courtney (1985) Swink (2000), and Khan et al. (2013) using 2, 3, and 7 items, respectively. For a detailed description see *Instrument revision* section. Table 10 represents the items generated to measure senior managers' support.

Table 10: Items for measuring senior managers' support

Items	
S1	I would be ready to put necessary effort to support MIS implementation.
S2	I would use effective change management strategies and processes to support MIS implementation.
S3	Supporting MIS implementation is a good idea.
S4	The likelihood that I would support MIS implementation is very high.
S5	I am ready to actively get involved in MIS implementation.

Scale and format selection

This study adopted five-point scales for all items to improve the precision of measurement of multiple-item constructs. The ranged from 1 (=strongly disagree), 2 (=disagree), 3 (=neutral), 4 (=agree) to 5 (=strongly agree).

Data collection procedure

Pre-test

For the pre-test an online version of the questionnaire in a word document was sent to eight senior managers, who were familiar with management information systems, to identify if additional questions were needed, remove any irrelevant questions, and rephrase the questions to improve clarity of the questions (De Vaus, 2013). The respondents were asked to comment on the structure, wording, content of the questionnaire, and to give suggestions to improve the clarity of the survey.

Pilot study

Simple random sampling was used to ensure random and equal representation across the population. 30 invitation emails were sent to board level senior managers to participate in the survey. 27 participants accepted the invitation and filled out the questionnaire (response rate 90%). The average response rate for studies involving senior management is 36.1% (Baruch, 1999). The online self-administrated survey was hosted on Atomik Research data base using Decipher software. Powerofopinions.co.uk was the platform used by the agency to host the survey. The average time to complete the survey was ten minutes. The survey was clear and no issues were found.

Data analysis

Pre-test

Instrument revision

After the pre-test, some of the statements of the questionnaire were reworded to enhance their clarity. For example, regarding the use of term 'top manager' in the original survey, respondent 1 said 'Is this an accepted term? I think of it as an informal term. I don't think a top manager would describe themselves in this way. Possibly senior manager? High level manager.' Therefore, the term was changed to 'senior manager' to avoid confusion since 'top manager' is more commonly used in USA and the target participants of this study are in the UK.

Respondent 3 stated 'Text above states this questionnaire will be on-line, so I imagine that the questionnaire itself will be re-formatted. It would look better if responses were indented from question headings, as I've done for question 1.' Headings were then added above each section of questionnaire e.g., the first part was headed as 'Individual Demographics'.

Regarding the question related to a participant's education level, respondent 3 commented 'Suggest title: Highest level of education? Some people might have all three levels of qualification – should they mark just one or all?', the question was changed accordingly to make clear what was expected. The first option regarding level of education was 'Diploma and under diploma', Participant 3 said 'Suggest 'no formal (management?) qualification. 'Under diploma' is an unusual phrase.' This option was changed to 'no formal qualification' and 'Diploma' to improve the question. In the pre-test version, the options given for education were 'college/university degree' and 'master or higher'. Respondent 5 said 'Other two options mention the certificate/award. Should you also mention degree here? 'College/university degree'. Therefore, the word 'degree' was added to be consistent.

Regarding the question 'How many years have you been a top manager of other firms before taking the current position?', respondent 6 commented 'What level of management is this? Difficult for people to answer unless they understand this. CEO?' The wording was changed to 'senior management' to remove any confusion.

There were two statements in the questionnaire regarding senior managers' attitude toward MIS implementation, as 'Using MIS is.....idea.' choosing a scale from 'bad idea' to 'good idea' from 1 to 5 and 'Using MIS is.....idea.' choosing a scale from 'foolish idea' to 'wise idea' from 1 to 5. Respondent 8 said 'To my mind, several of these questions are similar, e.g., 15 and 16. Would anyone think it was both a good

idea and a foolish idea'. In the pre-test version, there was a statement about senior managers' support to MIS implementation, 'using MIS would be' ranking from 1 to 5 from 'pleasant' to 'unpleasant'. Respondent 1 said 'I'm not sure 'pleasant' is the right word for describing a system. A manager might be more interested in concrete terms – beneficial,'

'To the uninitiated questions 13 to 21 seem very similar, (and why would any manager not want a good management information system, the issues are around what constitutes 'good' and how affordable are they - there is a cost benefit analysis in any management decision, even on a motherhood and apple pie question like 'do you think a MIS is a good idea!). Again, if these are carefully crafted to discern some hidden management bias in their personality make up then fine - but warn the person or they will switch off and not complete the questionnaire. My final thought is you have 2 themes here - management personality facets, and their openness to an MIS, but nothing an whether they have been involved in implementing a new MIS - is this intended? It feels like a missing element of the questionnaire' [P2].

The participant is referring to statements about senior managers' attitude and support toward MIS implementation (statements 13 to 21).

Based on the feedback from those involved in the pre-test, the statements regarding senior managers' attitude and support toward MIS implementation were changed to enable attitude and support to be measured more precisely. For example, 'Using MIS helps me to be more efficient and save time' ranking from 'strongly disagree' to 'strongly agree' from 1 to 5 to measure attitude was added.

Participant 2 commented 'Participant information sheet is fine, pretty standard stuff and would present no issue for me to agree to it.' and 'Part A of the questionnaire is fine on first reading and would present no issue for me to agree to it.' Respondents were positive about the five-point scale and the labelling of the scales because they thought that they could easily indicate their views via the scale. They also gave positive feedback about the length of the survey. The revised survey was then used in the next step of the survey development process.

Pilot test

Given the fact that the sample size of the pilot study was too small to run inferential statistics, the researcher explored the initial descriptive statistics (see Table 6).

Study 1

Participants demographics

According to Field (2018), as a rule of thumb, there needs to be between 5-15 participants for each predictor in order to obtain a reliable regression model. In this study there are 7 predictors (age, tenure, level of education, career variety, prior involvement in IS projects, positive self-image, and senior managers' attitude toward MIS implementation), therefore, between 35 to 105 participants are required in order to conduct regression analysis. Following the suggestion of Kline (2005) for having a minimum sample size of 300 participants for conducting structural equation modelling, this research had a sample size of 400 participants, reaching the minimum recommended sample size. The sample in this study consists of 400 senior managers in UK organisations selected from the population of firms operating in manufacturing industries. 70% of participants were male, 29 per cent were females, and 1 per cent was non-binary. Participants' age ranged from 20 to 64 years, with a mean of 41.5 and a standard deviation of 5.31 years. Tenure of participants varied from 6 months to 25 years and three months, with a mean of 5 years and six months and a standard deviation of 1,81 years. The manufacturing sector was chosen to recruit respondents because MIS plays a major role to coordinate business activities in this industry (Kebede and Bruwer, 2002).

Table 11: Demographic Profile of the Sample (N=400)

Demographic categories	Frequency	Percentage (%)
Gender		
Male	280	70%
Female	117	29%
Non-binary	3	1
Age		
18-24	1	0%
25-34	33	8%
35-44	243	61%
45-54	120	30%
55-64	3	1%
65+	0	0%
Education		
No formal qualification	2	1%
Diploma	6	2%
College degree	54	14%
University first degree	168	42%
Master's degree or higher	170	43%
Prior job functions		
Production/operations	112	28%
R&D/engineering	79	20%
Accounting/finance	75	19%
Management/administration	228	57%
Marketing/sales	86	22%
Personnel/labour	44	11%
Relations/law	18	5%
Other (please specify)	0	0%

Measures

Data collection procedure

In this study, simple random sampling was used to ensure random and equal representation across the population. In this method, every individual in the population is equal in the sample selection and selecting an individual does not affect the selecting of another (Etikan and Bala, 2017). 745 invitation emails were sent to board level senior managers asking them to participate in the survey. 400 senior managers accepted the invitation and filled out the questionnaire (response rate 54%). The average

response rate for studies involving senior management is 36.1% (Baruch, 1999). The survey was distributed by Atomik Research from 26 July to 1 August 2020.

To ensure confidentiality, participants names were not collected. This study used a self-administered online survey method to collect data because it allows the data to be collected from a large number of people in a cost-effective manner. Sampling allows the generation of findings that are statistically representative of the target population at a lower cost (Saunders, Lewis and Thornhill, 2009). In order to make sure that respondents complete the questionnaire and not skip questions, the questionnaire in this study was designed so that participants could not proceed to the next questions until they answered the previous question. The data was being collected during the pandemic when there were no face to face conferences in the UK and it was a huge challenge to recruit participants who met the inclusion criteria. Therefore, it was decided to use a marketing agency to collect the data. Data was collected using the help of a leading market research company, Atomik Research which has a large network with UK manufacturing companies that enabled them to undertake the survey rapidly. Therefore, based on the capacity profile of the company, Atomik Research was chosen to collect the data in this research. Atomik Research works in accordance with the MRS Code of Conduct which ensures the data collected is credible and accurate. The participants were also provided with the contact details of the Research Ethics Department if they had any concerns or complaints about the ethical conduct of the research.

Before data collection, a human research ethic approval was obtained. This research was approved on 18 June 2020 (reference: 23148-LR-Jun/2020- 25887-4) by the Research Ethics Committee of Brunel University. To maintain the validity and the authenticity of this research, the researcher ensured the willing consent of the participants by providing them with a consent form which gave the details about the research including the purpose, scope and the aim for maintaining the level of transparency. The consent form also informed the beneficence of the research for the participants. The participants were given the choice of opting out of the research at any point before submitting their responses to maintain their right to choose what information they shared. The researcher also ensured the proper handling of the data in order to maintain the confidentiality of the data collected, along with ensuring the proper use of labelling to maintain the privacy of the participants. The questions were designed to reduce the chance of bringing harm to the participants in any form during the data collection process.

Data analysis

Results

Data screening and cleaning

The adequacy of the data was examined by screening the data for missing values, normality, and outliers. IBM SPSS 26 was used to screen the data.

Missing data

The online survey required the respondents to complete each question before moving on to the next question, therefore, all the questions were answered by all the participants. A visual inspection of the data also confirmed that nothing was missing.

Univariate outliers and normality

Assessing normality

Not all the data in this study showed a normal distribution. Parametric tests such as correlation, linear regression, t-tests, etc. are based on the normal distribution assumption (Driscoll, 2000; Field, 2018). When the assumption of normality does not hold, the accuracy and reliability of conclusions is not possible (Öztuna, Elhan and Tüccar, 2006; Field, 2018). However, if the sample size is large enough (more than 30 or 40), the violation of normality assumption should not cause major problems (Pallant, 2011). Therefore, parametric procedures can be used when the data is not normally distributed (Elliot and Woodward, 2007). For example, for regression analysis, the residuals of the predicted dependant variable should be normally distributed (Pallant, 2011). Moreover, for Partial Least Square Structural Equation Modelling (PLS-SEM), which was used at a later stage to analyse the data, normality assumptions of data set is not required (Hair *et al.*, 2017).

There are different methods to assess normality such as visual inspection and normality tests (Kolmogorov-Smirnov (K-S) test (Öztuna, Elhan and Tüccar, 2006), Shaipiro-Wilk test (Peat and Barton, 2005; Öztuna, Elhan and Tüccar, 2006), Anderson-Darling test (Öztuna, Elhan and Tüccar, 2006), etc.). K-S is one of the most commonly used tests (Thode, 2002). The K-S test is based on comparing the sample to a normally distributed set of data with the same mean and standard deviation. The null hypothesis is that the sample is normally distributed. If the test is significant, the data is not normally distributed. The K-S test is highly sensitive to extreme values.

The Shapiro-Wilk test examines the correlation between the sample and the corresponding normal scores (Peat and Barton, 2005) and provides better power than the K-S test (Steinskog, Tjøtheim and Kvamstø,

2007). Powers is the possibility that the test correctly rejects the null hypothesis. Some researchers (Steinskog, Tjøtheim and Kvamstø, 2007) recommend the Shapiro-Wilk test as the best test for normality. In this study, the researcher used visual inspection, The K-S test and Shapiro-Wilk test using IBM SPSS 26 Table 12 presents the results of the normality tests.

Table 12: Tests for normality ; attitude: senior managers' attitude toward MIS implementation; support: senior managers' support toward MIS implementation.

	K-S test			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Age	0.061	400	0.001	0.988	400	0.002
Tenure	0.166	400	<0.001	0.822	400	<0.001
Career variety	0.192	400	<0.001	0.822	400	<0.001
Involvement in IS projects	0.250	400	<0.001	0.660	400	<0.001
Positive self-image	0.107	400	<0.001	0.980	400	<0.001
Attitude	0.116	400	<0.001	0.971	400	<0.001
Support	0.097	400	<0.001	0.978	400	<0.001

The K-S test is sensitive to extreme values (two extreme values 20 and 64). Under visual inspection (see Appendix I), age can be considered as normally distributed. The researcher did not expect tenure to be normally distributed. Most people tend to stay up to 5 years in a particular job, and then they tend to move on (see Appendix I). It is unlikely for career variety to have a normal distribution (see Appendix I) because it demonstrates different positions and job functions that an individual has during his career life. As expected involvement of senior managers in IS projects is not normally distributed. Although the results of K-S did not support normal distribution of positive self-image, attitude, and support, under visual inspection, it can be assumed that they are normally distributed.

Outliers

Outliers are the cases that have scores substantially different from all others in the data set. A univariate outlier has an extreme score on a single variable while a multivariate outlier has extreme scores on two or more variables (Kline, 2005). The researcher used the squared Mahalanobis distance to detect multivariate outliers using IBM SPSS AMOS 26. This is a common approach which measures between the distance in standard deviation units between the sample means and a set of scores (Byrne, 2012). Two outliers have been detected and were removed from the data set.

Multivariate outliers and normality

Multivariate normality of the data is a critically important assumption to conduct Structural Equation Modelling (SEM) analysis (Hair *et al.*, 2010). If the data is multivariate kurtotic, it would be problematic to SEM analyses. Multivariate kurtotic is the situation where the multivariate distribution of the observed variables (both tails and peaks) are different from a multivariate normal distribution (Raykov and Marcoulides, 2000). In the multivariate positive kurtosis, the score distribution would be peaked. While multivariate negative kurtosis will exhibit flat distribution with light tails (DeCarlo, 1997). IBM SPSS AMOS 26 was used to investigate multivariate normality in the data set. When the standardised kurtosis index (β_2) values are equal or greater than 7, it is an indicator of early departure from normality. Critical ratio (C.R.) represents Mardia's (1970, 1974) normalized estimate of multivariate kurtosis. Bentler (2006) suggested C.R. values higher than 5 indicate that the data are not distributed normally. Table 13 shows that all the items met the criteria except for career variety and senior managers' involvement in IS project, and tenure (C.R. values 290.3, 80.74, and 14.83, respectively). Additionally, skewness and its associated C.R. value is also presented in this table. For the purpose of this study, it was decided to proceed.

Table 13: Skewness and Kurtosis of All Items, including their associated C.R. ; CSE2P: positive aspect of PSI; CES1N: negative aspects of PSI;); A1: senior managers' opinion regarding value of MIS; A2: senior managers' opinion regarding costs and benefits of MIS implementation A3: senior managers' opinion regarding efficiency and time-saving of MIS; A4:senior managers' opinion about benefits of MIS; S1: senior managers' readiness to support MIS; S2: senior managers' use of change management strategies; S3: senior managers opinion regarding MIS implementation; S4:likelihood that senior managers support MIS implementation; S5: senior managers' readiness to involve in MIS implementation.

Variable	min	max	skew	C.R.	kurtosis	C.R.
Age	20.000	64.000	.035	.288	.594	2.425
Education	1.000	5.000	-.902	-7.364	.824	3.362
Career variety	.228	18.000	6.390	52.174	71.114	290.322
Tenure	.583	25.250	1.807	14.753	3.635	14.838
Involvement in IS projects	.000	40.000	3.497	28.552	19.779	80.747
CSE2P	1.000	4.167	.322	2.630	.565	2.307
CSE1N	1.000	4.500	-.217	-1.776	-.149	-.609
S5	1.000	4.000	.482	3.932	-.089	-.362
S4	1.000	5.000	.634	5.180	.334	1.362
S3	1.000	4.000	.512	4.185	-.221	-.900
S2	1.000	4.000	.581	4.747	.059	.242
S1	1.000	4.000	.477	3.898	-.197	-.804
A4	1.000	4.000	.477	3.894	-.068	-.279
A3	1.000	4.000	.373	3.047	-.256	-1.045
A2	1.000	5.000	-.239	-1.949	-.503	-2.054
A1	1.000	5.000	.574	4.685	-.481	-1.963
Multivariate					121.261	50.525

Reliability and Validity

Reliability: Cronbach's alpha

The reliability can assess the internal consistency of a measure. It shows to what degree the items making up the scale measure the same underlying attribute. The most commonly used statistic to measure internal consistency is Cronbach's alpha. This statistic shows the average correlation among all the items making up the scale. It can be between 0 to 1, but its values are dependent on the number of items in the scale (Pallant, 2011). A minimum level of 0.7 is recommended (Nunnally, 1978). Cronbach's alpha can be quite small when there are a small number of items in the scale. Cronbach alpha for attitude is (=0.598),

support (=0.751) and CSES (=0.705). Ideally, Cronbach's alpha should be above 0.7, however, if there are less than 10 items in a construct it can be 0.5 (Pallant, 2011). Therefore, Cronbach's alpha for attitude was acceptable.

Validity

A scale should be validated to ensure that it measures what it is supposed to measure. The construct validity investigates the relationship of a variable with other variables (Pallant, 2011). The researcher only conducted the initial construct validity of attitude and support measures since they were designed by the researcher. Proving the validity of the measures beyond the construct validity was outside the scope of the current research project. Factor analysis with PCA was used as a method of extracting factors to test the initial validity of measures. In this study, factor analysis was conducted using principal components analysis (PCA) using varimax rotation (Eigenvalues >1; suppress factor loadings <0.3 suggested by Hair et al., 2010). Bartlett's (1954) test of Sphericity and Kaiser-Meyer-Olkin (KMO) value of 0.6 recommended by Kaiser (1970, 1974) were used to determine the suitability of data to be factorised. Scree plots were inspected to investigate clear breaks in components.

Positive self-image

A 12-item measure that optimally taps the central Core Self-Evaluation (CSE) constructs developed by Judge et al. (2003) was used to measure senior managers' positive self-image. Gardner and Pierce (2010) proposed that this measure is best used when a participant's time is limited and because senior managers' time is really limited, the researcher chose this direct approach to measure CSE. The validity of this scale was backed up by researchers (e.g., Gardner and Pierce (2010)), therefore, the researcher did not conduct the validity test on this construct. Judge et al. (2003) validated CSE construct by conducting four independent samples including two field studies from employees and managers of two companies and two samples of undergraduate students at two different universities. The data was collected on the CSES items, several Big Five traits, four core traits (neuroticism, self-esteem, generalized self-efficacy, and locus of control), and the outcome measures including job and life satisfaction and job performance. They validated the construct by examining three forms of reliability (internal consistency, test-retest (stability), and interrater reliability), testing unitary factor structure, convergent validity, discriminant validity, empirical validity, and incremental validity in predicting the outcomes controlling for other related personality traits. The 12-item measure was modified according to recommendation by Hiller and Hambrick (2005) with generic items becoming more specific in order to capture senior managers'

perception about themselves. For instance, the item, 'When I try, I generally succeed' might be reworded as, 'When I try, I almost always succeed' (see Table 8).

CSES is a unidimensional scale (Judge et al., 2003), therefore item-parcelling can be used (Matsunaga, 2008). Two parcels of items (positive dimension of CSE and negative dimension) were created based on their item content (Landis, Beal and Tesluk, 2000). The internal consistency reliabilities and scree test results confirm the reliability of the parcels (see Table 14). The minimum standard for reliability (Cronbach's alpha>0.6) was reached for both parcels (Kishton and Widaman, 1994). Item parcelling improves commonality across indicators and improves modelling efficiency, providing more stable estimates, and fit the data better (Matsunaga, 2008).

Table 14: Number of items; internal consistency reliability; scree test; CSE2P: positive aspect of PSI; CES1N: negative aspects of PSI.

Parcel	Number of items	Internal consistency reliability	Scree test
CSE1N	6	0.631	1
CSE2P	6	0.624	1

Attitude

Four measures were used to measure the senior manager's attitude. The participants were asked to evaluate four statements on a five-point Likert scale. The mean of attitude items was calculated to create the 'attitude' variable. Item-based approach (see Matsunaga, 2008) was chosen because the number of observed variables is less than 6. Table 15 shows the exploratory factor analysis for senior managers' attitude toward MIS implementation, The Bartlett's test was significant ($p < 0.001$) and the KMO measure of sampling adequacy was 0.678, above the acceptable level of 0.6. All the items loaded onto a single factor explaining 47.8% of the variance. Attitude 2 did not meet the minimum value of 0.50 for factor loadings (Hair, Risher, et al., 2019), it was removed (see Table 15). The final measure consists of 3 scale items.

Table 15: Scale items, descriptive statistics and factor loadings for attitude (N=400); A1: senior managers' opinion regarding value of MIS; A2: senior managers' opinion regarding costs and benefits of MIS implementation A3: senior managers' opinion regarding efficiency and time-saving of MIS; A4:senior managers' opinion about benefits of MIS.

Measure	Mean	SD	Factor loading
A1	2.40	0.996	0.736
A2	3.23	0.950	0.368
A3	2.13	0.799	0.780
A4	2.13	0.799	0.793

KMO 0.678

Bartlett's < 0.001

Variance explained 47.8%

After removing item 2, the model was rerun. The overall KMO was 0.659; the communality was above 0.50, and the rotated matrix was left with three factors or constructs. 61.47% of total variance is explained by all items (see Table 17). The reliability of the construct was recalculated and Cronbach's alpha was 0.676.

Table 16: Item's factor loading correlation for attitude; A1: senior managers' opinion regarding value of MIS; A3: senior managers' opinion regarding efficiency and time-saving of MIS; A4:senior managers' opinion about benefits of MIS.

	A1	A3	A4
A1	1		
A3	0.370	1	
A4	0.418	0.476	1

Table 17: SPSS output total variance explained for attitude

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.844	61.473	61.473	1.844	61.473	61.473
2	.639	21.292	82.765			
3	.517	17.235	100.000			

Extraction Method: Principal Component Analysis.

Support level

Level of support was measured by five measures (see Table 10). The senior managers evaluated five statements on a five-point Likert scale. The average of support items was calculated to create the 'support' variable. KMO value was 0.791 and Bartlett's was less than 0.001. 50.3% of total variance is explained by all items loading on one factor with factor loadings between 0,562 and 0.747. All items at the minimum value of 0.50 for factor loadings (Hair, Risher, et al., 2019) However, inspecting the communality matrix which measures of how much the model explained each variable. Values below 0.5 should be eliminated (Hair *et al.*, 2019). Communalities ranging from 0.316 to 0.573 and support 4 with communality value of 0.316 was eliminated (see Table 18). The final measure consists of 4 scale items.

Table 18: SPSS output communalities for support; S1: senior managers' readiness to support MIS; S2: senior managers' use of change management strategies; S3: senior managers opinion regarding MIS implementation; S4:likelihood that senior managers support MIS implementation; S5: senior managers' readiness to involve in MIS implementation.

	Initial	Extraction
S1	1.00	0.551
S2	1.00	0.520
S3	1.00	0.573
S4	1.00	0.316
S5	1.00	0.559

Note: Extraction Method: Principal Component Analysis

After item 4 was removed, the model was rerun. The overall KMO was 0.76; the commonality was above 0.50, and the rotated matrix was left with four factors or constructs. The reliability of the construct was recalculated and Cronbach's alpha was 0.754.

Table 19: Scale items, descriptive statistics and factor loadings for support (N=400); S1: senior managers' readiness to support MIS; S2: senior managers' use of change management strategies; S3: senior managers opinion regarding MIS implementation; S5: senior managers' readiness to involve in MIS implementation.

Measure	Mean	SD	Factor loading
S1	2.23	0.831	0.763
S2	2.21	0.807	0.720
S3	2.11	0.844	0.789
S5	2.17	0.808	0.760

KMO 0.76

Bartlett's < 0.001

Variance explained 57.51%

Table 20: Items factor loading correlation for Support level; S1: senior managers' readiness to support MIS; S2: senior managers' use of change management strategies; S3: senior managers opinion regarding MIS implementation; S5: senior managers' readiness to involve in MIS implementation.

	S1	S2	S3	S5
S1	1			
S2	0.442	1		
S3	0.457	0.400	1	
S5	0.413	0.372	0.512	1

Table 21: SPSS output total variance explained for support

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.300	57.510	57.510	2.300	57.510	57.510
2	.668	16.711	74.222			
3	.550	13.751	87.973			
4	.481	12.027	100.000			

Extraction Method: Principal Component Analysis

Descriptive statistics

Almost three-quarters of the participants were from companies that employ less than 1,000 employees. Twenty-three per cent of participants were from organisations that employ between 1,000 to 10,000 employees and just two per cent of participants were from companies with more than 10,000 employees.

Representativeness in sampling

To judge the representativeness of the sample, the characteristics of the sample were compared to those of the population. Two main characteristics of the sample and target population were compared including distribution of the UK manufacturing organisations by region and proportion of SMEs. According to Department for Business Innovation and Skills (2020), 99.12% of the manufacturing population in the UK is accounted for SMEs (companies with less than 250 employees). 28% of the respondents were from SMEs (see Table 23). z-test was conducted to make sure that the majority of the sample were from SMEs. Z-test can be used to investigate if an observed proportion is equal to a pre-specified proportion. If the p-value is more than 0.05, the hypothesis that there is not a significant difference between the two proportions can be accepted (Fleiss, Levin and Paik, 2013). The results from the z-test confirmed that there is no significant difference between the sample proportion and the target population ($z\text{-statistic}=1.43$; $p=0.15$). Therefore, the sample can be a good representation of the population.

In terms of distribution of manufacturing organisations in the UK, the number of manufacturing organisations in each region including England, Wales, Scotland and Northern Ireland were compared between the sample and the target population (actual data was adopted from Office for National Statistics (ONS), 2020 by conducting Chi-square test (see Table 22). The results from Chi-Square test confirmed that the sample is a good representative of the target population ($\chi^2=1.05$; $p=0.79$).

Table 22: Number of organizations in each region from sample and the target population

Region	Sample	Target population
Scotland	24	5040
Wales	18	3300
Northern Ireland	10	2710
England	348	70640

Table 23: Business employee size

Number of employees	Sample	Frequency
1-4	0	0%
5-49	24	6%
50-249	87	22%
250-1,000	190	48%
1001-5,000	68	17%
5,001-10,000	24	6%
10,000+	7	2%

Table 24: Annual turnover of the sample organisations

Annual turnover	Total	Characteristics Frequency %
Total	400	100%
Less than £500k	0	0%
£500k-£999k	15	4%
£1m - £5m	98	25%
£6 - £10	136	34%
£11 - £15	90	23%
£16 - £25	37	9%
More than £25m	24	6%

Inferential statistics

Regression analysis

In order to conduct regressions, regression assumptions need to be verified including the linear relationship between independent variables (predictors) and dependent variables, absence of outliers and multicollinearity, homoscedasticity, and normal distribution of residuals (Pallant, 2011).

Simple linear regressions were used to test if senior managers' age, career variety, tenure, highest level of education (no formal education, diploma, college degree, university first degree, and master's degree or higher), prior involvement in IS projects, two elements of PSI (CSES-P and CSES_N), significantly predicted senior managers' attitude toward MIS implementation. Given the fact that education was a categorical variable with more than two levels (no formal education, diploma, college degree, university first degree, and master's degree or higher), the researcher created dummy variables in order to be able to run regression with different levels of education. It was found that senior managers' career variety, tenure, university first degree, prior involvement in IS projects, CSES_P, CSES_N, and PSI significantly predicted senior managers' attitude toward MIS implementation. It was found that senior managers' age did not significantly predict their attitude ($\beta=0.040$, $p=0.423$). Simple linear regression was also used to test if senior managers' attitude toward MIS implementation significantly predicted their support toward MIS implementation. It was found that attitude significantly predicted support ($\beta=0.642$, $p<0.001$) (see Table 25). These are the results from the separate linear regression, the researcher included all the results in one table rather than having separate table for every single linear regression.

Table 25: Simple linear regressions analysis predicting senior managers' attitude toward MIS implementation and their support (N=400); Attitude: senior managers' attitude toward MIS implementation; PSI: positive self-image; Support: senior managers' support toward MIS implementation.

Variable	Unstandardized coefficients β	Standardized coefficients Beta (β)	t	p	Adjusted R ²
Age→attitude	0.005	0.040	0.802	0.423	0.001
Career variety→attitude	0.078	0.166	3.361	0.001	0.025
Tenure→attitude	-0.18	-0.128	-2.573	0.10	0.014
Education					0.022
No formal education→attitude	-0.507	-0.060	-1.203	0.230	
diploma→attitude	-0.216	-0.044	-0.876	0.382	
College degree→attitude	0.243	0.138	2.620	0.009	
University first degree→attitude	0.149	0.123	2.308	0.021	
Involvement in IS projects →attitude	-0.053	-0.344	-7.317	0.000	0.116
Positive self-image→attitude	0.775	0.537	12.691	0.000	0.286
CSES_P→attitude	0.600	0.472	10.684	0.000	0.17
CSES_N→attitude	0.462	0.414	9.086	0.000	0.221

Attitude→support	0.620	0.642	16.727	0.000	0.411
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Multiple linear regression was also used to test if senior managers' age, career variety, tenure, highest level of education (no formal education, diploma, college degree, university first degree, and master's degree or higher), prior involvement in IS projects, two elements of PSI (CSES-P and CSES_N), PSI significantly predicted senior managers' attitude toward MIS implementation. The overall regression was statistically significant ($R^2=0.408$, $F(10,389)=28.542$, $p<0.00$). It was found that senior managers' career variety, tenure, no formal education, prior involvement in IS projects, CSES_P, and CSES_N significantly predicted senior managers' attitude toward MIS implementation. It was found that senior managers' age did not significantly predict attitude ($\beta=0.077$, $p=0.067$) (see Table 26). The multiple R between the independent variables and attitude was 0.408. Such effect sizes can be considered as large for psychologists (McGrath and Meyer, 2006). The strongest predictor was for CSES_P followed by CSES_N, with slightly weaker effects for Involvement in IS projects, followed by tenure and career variety.

Table 26: Multiple linear regression analysis predicting senior managers' attitude toward MIS implementation (N=400); Attitude: senior managers' attitude toward MIS implementation

Variable	Unstandardize d coefficients β	Standardized coefficients Beta (β)	t	p
Age→attitude	0.009	0.077	1.836	0.067
Career variety→attitude	0.064	0.136	3.406	0.001
Tenure→attitude	-0.024	-0.166	-3.812	0.000
Education				
No formal education→attitude	-1.094	-0.129	-3.303	0.001
diploma→attitude	-0.229	-0.047	-1.187	0.236
College degree→attitude	0.142	0.081	1.919	0.056
University first degree→attitude	0.007	0.006	0.134	0.894
Involvement in IS projects →attitude	-0.034	-0.223	-5.540	0.000
CSES_P→attitude	0.427	0.336	7.989	0.000
CSES_N→attitude	0.324	0.291	6.579	0.000

Note. $F(10,389)=28.542$, $p<0.001$, adj $R^2=0.408$

Statistical analysis method

Although many studies used regression analyses to test hypotheses regarding the impact of senior managers' characteristics on R&D investment (Serfling, 2014); strategic change (Zhu, Hu and Shen, 2020); open innovation adoption (Ahn, Minshall and Mortara, 2017), etc, some studies used Structural Equation Modelling (SEM) to test the impact of senior managers' characteristics on behavioural integration (Simsek *et al.*, 2005); firm performance (Hermano and Martín-Cruz, 2016); MIS effectiveness (Le *et al.*, 2020). In this study, SEM seems particularly appropriate because it allows estimation of multiple correlations, simultaneously includes observed and latent constructs in these correlations, and accounts for the biasing effects of random measurement error in the latent constructs (i.e., positive self-image, attitude and support). Furthermore, SEM was used to analyse the data in this study for two main reasons. Firstly, according to Jeon (2015), estimating abstract concepts such as self-image requires using the mean of a set of variables resulting in measurement error occurrence which impacts the prediction power of regression equations. Therefore, it is suggested that using SEM can reduce the problem of measurement error (Byrne, 2012; Jeon, 2015). Secondly, multiple regression does not capture latent variables (constructs that are not observable i.e., self-concept and attitude). The major advantage of using SEM is that it can incorporate both observed and unobserved variables uncontaminated by measurement errors in the indicators (Byrne, 2012; Jeon, 2015).

In this study, Partial Least Square Structural Equation Modelling (PLS-SEM) was chosen as the tool for statistical analysis for several reasons. Firstly, it can measure the relationships between constructs and variables more accurately compared to other statistical techniques (Hair, Sarstedt, *et al.*, 2014). Secondly, it can be used for prediction (Hair *et al.*, 2017) and one of the objectives of this study is to predict senior managers' support level toward MIS implementation. Thirdly, greater statistical power at all sample sizes can be achieved in comparison to Covariance Based SEM (CB-SEM) (Hair *et al.*, 2017). Finally, it does not have normality assumptions of the data and the data set used in this study was not normally distributed (see Assessing normality section; p.116). SEM is increasingly being used for data analysis in concept and theory development studies in social sciences (Chin, Peterson and Brown, 2008). SEM analysis involves evaluating multiple variables and their relationships simultaneously. CB-SEM and PLS-SEM are the two SEM based techniques.

The two methods have substantial different statistical objectives. The goal of CB-SEM is to minimize the difference between the observed and estimated covariance matrices, while the objectives of PLS is to maximize the explained variance of dependent variable(s) (Hair, Ringle and Sarstedt, 2012). CB relies on common factor model, while PLS relies on the composite model (Hair *et al.*, 2017). The common factor model

removes the specific variance and the error variance, which is one the limitations of this approach, because the specific variance could predict the dependent variables in the model. In contrast, the composite model relied upon by PLS has the specific, error, and common variance. This approach is limited because it has some error variance. However, both approaches can only provide estimations of variables that the constructs represent (Rigdon, Sarstedt and Ringle, 2017).

CB-SEM is mainly used to confirm the established theory while PLS-SEM is more suitable for exploratory work to find and evaluate causal relationships, but it can be also used for confirmatory research (Hair, Ringle and Sarstedt, 2011). Models developed by PLS-SEM have high predictive accuracy, and they are well-developed to explain causal relationships (Sarstedt *et al.*, 2019). In other words, PLS enables the researcher to understand underlying causes and predication, as well as describing theoretical constructs and their relationships (Gregor, 2006). PLS approach is mostly appropriate to test a theory and recommend for management practice (Hair *et al.*, 2017). In this study, SmartPLS 3 was used to conduct PLS-SEM. Figure 3 graphically depicts the set of relationships, inner, and outer model.

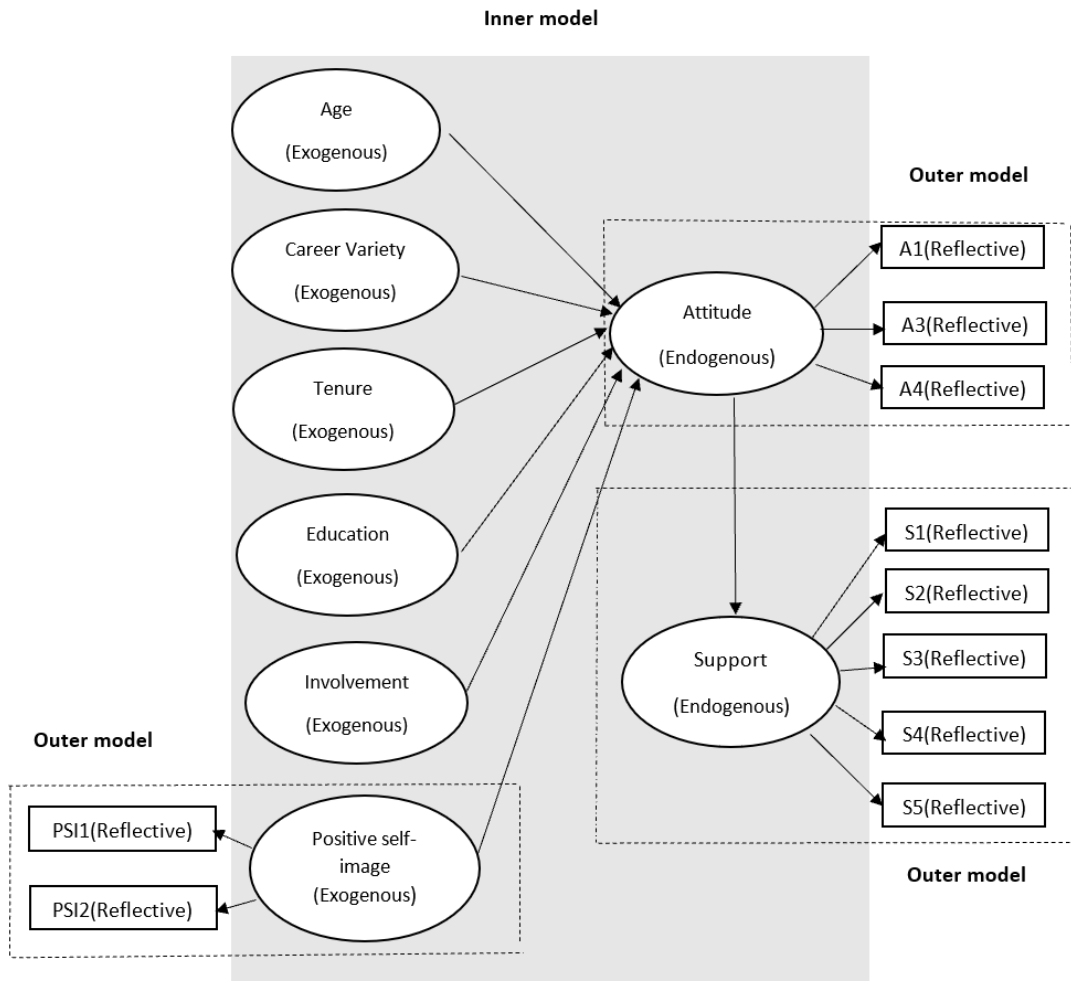


Figure 3: The theoretical model of Study 1; attitude: senior managers' attitude toward MIS implementation; A1: senior managers' opinion regarding value of MIS; A3: senior managers' opinion regarding efficiency and time-saving of MIS; A4: senior managers' opinion about benefits of MIS; support: senior managers' decision to support MIS implementation; S1: senior managers' readiness to support MIS; S2: senior managers' use of change management strategies; S3: senior managers opinion regarding MIS implementation; S4: likelihood that senior managers support MIS implementation; S5: senior managers' readiness to involve in MIS implementation; PSI1: positive aspects of positive self-image; PSI2: negative aspects of positive self-image; education: senior managers' highest level of education; involvement: number of IS projects that senior managers involved in.

Model specification

The model specification deals with measurement model (outer model) and structural model (inner model) model. While the measure model shows relationships between a latent variable and its indicators, the structure model demonstrates relationships between latent variables (Hair *et al.*, 2017). In this study, there are 3 constructs (positive self-image, senior managers' attitude, and senior managers' support level), and structure model was used to evaluate the relationships between these constructs with their indicator variables. Based on the conceptual framework, the results of the preliminary data analysis in previous section, the model was set up.

Outer model evaluation

The outer model also referred to as the measurement model identifies the relationships between each latent variable (positive self-image, attitude, and support) and its indicators (Hair et al., 2017). The preliminary data analysis identified the retained measurement items for further analysis. Although the development and validation of the new measures was beyond the scope of this research project, the researcher still explored the initial psychometric characteristics of measures the researcher created in order to check their reliability in relation to the model. In the outer model, the constructs were examined in terms of reliability and validity. Indicator reliability, internal consistency reliability, convergent validity, and discriminant validity were executed.

Table 27: Component loading for the outer model; Attitude: senior managers' attitude toward MIS implementation; A1: senior managers' opinion regarding value of MIS; A3: senior managers' opinion regarding efficiency and time-saving of MIS; A4:senior managers' opinion about benefits of MIS; Support: senior managers' decision to support MIS implementation; S1: senior managers' readiness to support MIS; S2: senior managers' use of change management strategies; S3: senior managers opinion regarding MIS implementation; S5: senior managers' readiness to involve in MIS implementation; PSI: senior managers' positive self-image; CSE2P: positive aspect of PSI; CES1N: negative aspects of PSI.

	PSI	attitude	support
CSE1N	0.75		
CSE2P	0.88		
A1		0.76	
A3		0.78	
A4		0.81	
S1			0.75
S2			0.74
S3			0.79
S5			0.75

Indicator reliability

Indicator reliability evaluates the outer loadings for each latent variable. Recommended outer loading to retain an item is greater than 0.708 (Hair et al., 2017). Indicator reliability of all items in this study was within the recommended range (see Table 27). Two item-parcels measuring positive self-image ranged from 0.75 to 0.88. Three items measuring senior managers' attitude ranged from 0.76 to 0.81. Four items measuring support ranged from 0.74 to 0.79.

Internal Consistency Reliability

Internal consistency reliability is also called as composite reliability. It indicates the shared variance among the observed variables of a latent construct (Hair et al., 2017). Cronbach's alpha analysis assesses the consistency within the factor structure (Djamba and Neuman, 2002). The recommended Cronbach's alpha of 0.70 indicates internal consistency. Internal consistency reliability for constructs in this study ranged from 0.52 to 0.69 (see Table 28).

Convergent Validity

Convergent validity measures how close the indicator variables are together to measure the latent variable. It is determined by the average variance extracted (AVE) from each construct. AVE more than 0.50 indicates adequate convergence. AVE greater than 0.5 means that construct explains more than half of the variance

of its variables (Hair *et al.*, 2017). The AVE values are 0.61 (attitude), 0.57 (support), and 0.67 (positive self-image). These values indicate convergent validity of the constructs.

Table 28: Construct reliability and validity; Attitude: senior managers' attitude toward MIS implementation; Support: senior managers' support toward MIS implementation; PSI: senior managers' positive self-image.

	Cronbach's alpha	Composite reliability	Average variance extracted (AVE)
Attitude	0.69	0.83	0.61
Support	0.75	0.84	0.57
PSI	0.52	0.80	0.67

Discriminant Validity

Discriminant validity illustrates how much each latent variable is different from other latent variables (Hair *et al.*, 2010). Discriminant validity confirms that each construct measures a unique phenomenon (Hair *et al.*, 2017). The Fornell-Larcker approach and HTMT are two main approaches to examine discriminant validity with PLS-SEM (Hair *et al.*, 2017). Each square root of AVE of each construct is diagonal elements was greater than the correlation between the constructs and others in non-diagonal elements. This indicates qualified discriminant validity (see Table 29).

Table 29: Correlations among construct scores; Attitude: senior managers' attitude toward MIS implementation; PSI: positive self-image; Support: senior managers' support toward MIS implementation.

Correlations among variables			
Attitude	0.784		
PSI	0.545	0.819	
Support	0.666	0.513	0.758

Note: The square root of average variance extracted on the diagonal in bold

Inner model evaluation

After establishing that the outer model is reliable and valid, several steps need to be taken to assess the hypothesized relationships within the inner model. The inner model was used to assess the predictive capabilities of the model and relationships among variables. PLS does not have a standard goodness-of-fit

(GOF) indices. The model quality is evaluated based on its ability to predict the endogenous constructs (Hair, Sarstedt, *et al.*, 2014). According to Hair, Hult, *et al.* (2014), there are six steps to evaluate the inner model: 1) common method bias, 2) collinearity analysis, 3) path coefficient analysis, 4) predictive relevance analysis, 5) effect size analysis, 6) mediating effect testing. The first two steps evaluate common method bias and multicollinearity in the data set. Predictive relevance examines the prediction capabilities of the model while effect size assesses the effect of an exogenous variable on an endogenous variable. Path coefficient analysis examines the hypotheses from H1 to H6 to address Research Question 1. The mediating effect testing is to test hypotheses H7 and H8 to address Research Question 2. Each step is presented in detail in the following sections.

Common Method Bias

In the context of PLS-SEM, common method bias is a phenomenon that is caused by the measurement method used in an SEM study (i.e., four indicators on a Likert-scale employed to measure senior managers' support toward MIS implementation). For instance, the instructions at the top of a questionnaire may affect the responses in the same direction, causing the indicators to share a certain amount of common variation (Kock, 2015). Common method bias is examined based on factor-level variance inflation factor (VIF). VIF examines how much the variance of an estimated regression coefficient is increased because of collinearity (Pallant, 2011). The occurrence of a VIF greater than 3.3 is an indicator of pathological collinearity, also showing that common method bias may contaminate a model. VIF less than 3.3 from a full collinearity test can represent a model free of common method bias (Kock, 2015). In the PLS, one of the three constructs (positive self-image, attitude, and support) was considered a dependent variable; the others were considered as predictors. In particular, three analyses were executed:

1. Positive self-image and attitude as predictors of support;
2. Positive self-image and support as predictors of attitude;
3. Attitude and support as predictors of positive self-image.

The findings showed that the model is not contaminated by common method bias since all VIF were less than 3.3 (see Appendix G).

Collinearity Analysis

The first step in evaluating the inner model is checking for potential collinearity issues among the predictor variables. In this study all VIF values ranged from 1.14 to 1.55, less than 3.3 confirming that there is no

collinearity problem among the predictor variables (see Table 30). All the constructs were retained for hypothesis testing.

Table 30: Variance Inflation Factor values for the predictor variables; CSE2P: positive aspect of PSI; CES1N: negative aspects of PSI; A1: senior managers' opinion regarding value of MIS; A3: senior managers' opinion regarding efficiency and time-saving of MIS; A4: senior managers' opinion about benefits of MIS; S1: senior managers' readiness to support MIS; S2: senior managers' use of change management strategies; S3: senior managers opinion regarding MIS implementation; S5: senior managers' readiness to involve in MIS implementation.

	VIF
CSE1N	1.14
CSE2P	1.14
A1	1.27
A3	1.355
A4	1.417
S1	1.453
S2	1.355
S3	1.551
S5	1.468

Path Coefficient Analysis – Research Question 1

Standardised path coefficients within the inner model were examined by running PLS Algorithm analysis. Significances of the path within the inner model were examined by bootstrapping (Hair, Ringle and Sarstedt, 2013). (e.g., use bootstrapping to assess significance; provide confidence intervals)(Hair, Ringle and Sarstedt, 2013). For a confidence level of 99%, 95% 90%, the typical critical t values are 2.58,1.96, and 1.65, respectively. In this study, 1000 bootstrap subsamples were used to get more stable results (Hair et al., 2014). The predictive accuracy of the model was examined by coefficient of determination (R^2). R^2 is a measure which shows the predictive accuracy of the model. R^2 ranges from 0 to 1 and 1 shows complete predictive accuracy. A rough rule of thumb for an acceptable R^2 is 0.25, 0.50, and 0.75 describing weak, moderate, or substantial levels of predictive accuracy. R^2 is a valuable tool to assess the quality of the model (Hair et al., 2013). In this study, the R^2 value of attitude and support was 0.42 and 0.44, respectively. These values are above the recommended threshold of 0.1 (Falk and Miller, 1992). These results confirmed that it is appropriate to examine the significance of the associated paths with attitude and support. Table 31 presents

the results of the inner model with its path coefficients and their significance levels. Figure 3 shows the factor loadings of the proposed model. The effect size of each path model is examined by Cohen's f^2 . f^2 can be calculated by measuring the change in R^2 when a specific construct is removed from the model. To calculate f^2 , two path model ran. The first one was the full model as specified by the hypotheses, which had R^2 of the full model ($R^2_{included}$). The second model was identical expect that a selected exogenous construct was removed from the model, which had the R^2 of the reduced model ($R^2_{excluded}$). f^2 can be calculated by the following formula:

$$f^2 = \frac{R^2_{included} - R^2_{excluded}}{1 - R^2_{included}}$$

Based on f^2 value, the effect size of a particular endogenous construct can be examined. Effect size f^2 (e.g., 0.02, 0.15, 0.35 for weak, moderate, strong effects) (Hair, Ringle and Sarstedt, 2013). In this study, college degree, career variety, tenure, and prior involvement in IS had small effect size on attitude ($f^2 = 0.1, 0.04, 0.05, 0.07$, respectively), while positive self-image had a strong effect size on attitude ($f^2 = 0.43$). Attitude had a strong effect size on support ($f^2 = 0.79$).

Table 31: Path Coefficient Significance Testing; f^2 : effect size; Attitude: senior managers' attitude toward MIS implementation.

Path	Hypotheses	β	T value	P value	f^2
Age → Attitude	H1	0.05	1.10	0.27	
Career variety → Attitude	H2	0.16	4.69	<0.001	0.04
Tenure → Attitude	H3	-0.18	5.30	<0.001	0.05
Education → Attitude	H4	0.10	1.67	0.095	
College degree → Attitude		0.14	2.80	<0.01	0.1
Master's degree → Attitude		-0.03	0.68	0.5	
Prior involvement in IS → Attitude	H5	-0.22	6.03	<0.001	0.07
Positive self-image → Attitude	H6	0.52	13.71	<0.001	0.43

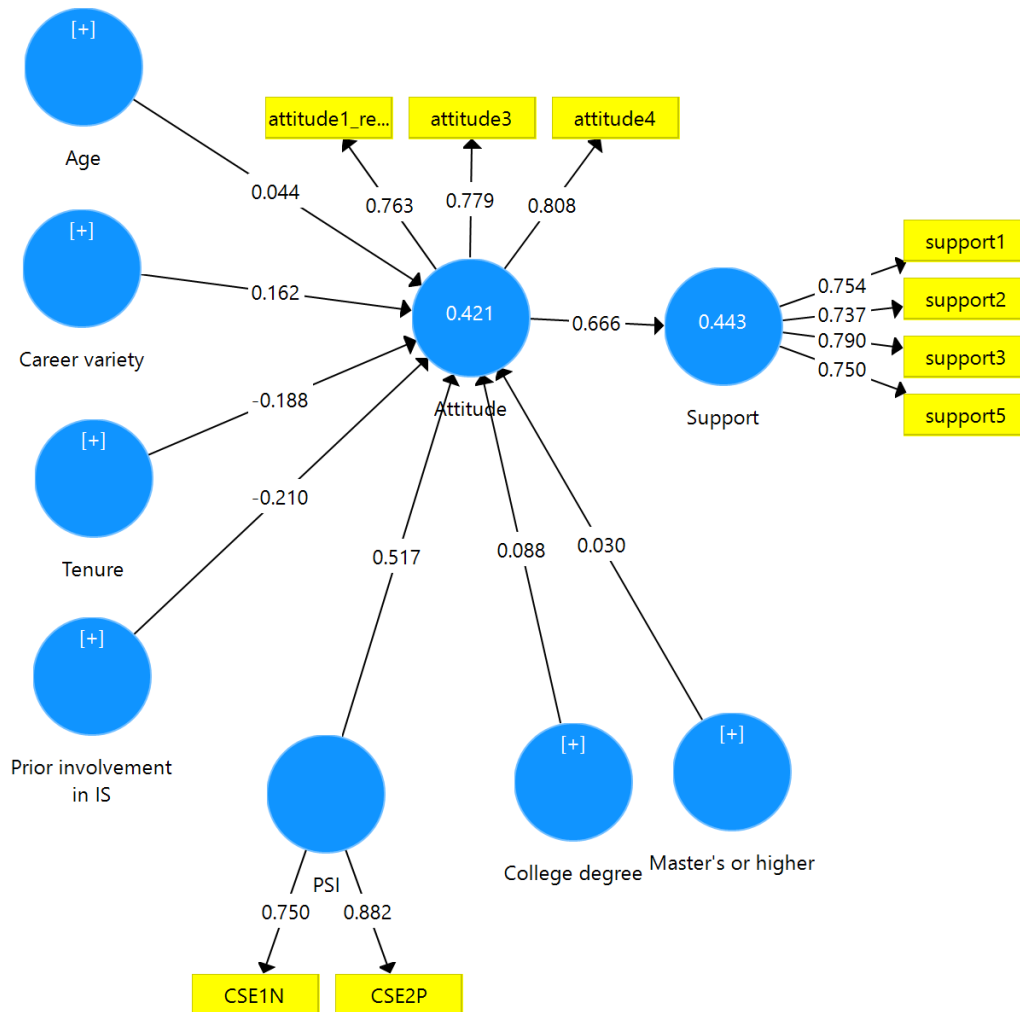


Figure 4: Factor loadings of the model; Attitude: senior managers' attitude toward MIS implementation; PSI: senior managers' positive self-image; CSE2P: positive aspect of PSI; CSE1N: negative aspects of PSI; Support: senior managers' support toward MIS implementation; ; Attitude1: senior managers' opinion regarding value of MIS; Attitude3: senior managers' opinion regarding efficiency and time-saving of MIS; Attitude4: senior managers' opinion about benefits of MIS; Support1: senior managers' readiness to support MIS; Support2: senior managers' use of change management strategies; Support3: senior managers opinion regarding MIS implementation; Support5: senior managers' readiness to involve in MIS implementation

implementation.

Hypotheses analysis

This section examines H1-H6 to address Research Question 1, which concerns the impact of age, career variety, tenure, education, involvement in IS projects, and positive self-image on senior managers' attitude toward MIS. **H1** proposes that senior managers' age is negatively related to their attitude toward MIS implementation. Age did not have a significant negative effect on attitude ($\beta=0.05$, $P>0.05$). Thus, not supporting **H1**. **H2** proposes that senior managers' career variety is positively related to their attitude toward MIS implementation. Career variety had a significant positive effect on attitude ($\beta=0.16$, $P<0.001$). Therefore, **H2** was supported. **H3** proposes that senior managers' tenure is negatively related to their attitude toward MIS implementation. Tenure has a negative significant effect on attitude ($\beta=-0.18$, $P<0.001$). Thus, **H3** was supported. **H4** proposes that senior managers' education is positively related to their attitude toward MIS implementation. The results showed that education does not have any significance impact on attitude ($\beta=0.10$, $P>0.05$). Given the mixed results from the simple linear regression and multiple linear regressions, the researcher conducted a one-way ANOVA to test the impact of different levels of education. The ANOVA test showed a significant difference between the different levels of education. Because two of the groups of education have small size (no formal qualification=2; diploma=6) ANOVA was showing significance but post hoc results did not show any significant differences. Therefore, the first two classes were removed from the analysis and ANOVA was run between three classes (college degree, university degree, and master's degree or higher) (see Table 32). The results show that there is a significant difference between college degree and master's degree or higher. To investigate the education puzzle further, we analysed education as a series of dummy variables for different levels of education rather than a continuous variable. The results showed that there is a significant positive association between education and attitude when senior managers had college degrees ($P<0.01$). however, there is no significant negative association between master's degree and attitude ($P>0.05$).

Table 32: Post Hoc test; Level of education: senior managers' highest level of education.

Level of education	Level of education	Mean difference	Standard error	significance
College degree	University first degree	0.093	0.092	0.924
	Master's degree or higher	0.243	0.092	0.025
University first degree	College degree	-0.937	0.092	0.924
	Master's degree or higher	0.149	0.063	0.061
Master's degree or higher	College degree	-0.243	0.092	0.025
	University first degree	-0.149	0.064	0.061

H5 proposes that senior managers' involvement in IS projects is positively related to their attitude toward MIS implementation. Involvement in IS project had a negative significant effect on attitude ($\beta = -0.22$, $P < 0.001$). Thus, **H5** was supported. **H6** proposes that Senior managers' positive self-image is positively related to their attitude toward MIS implementation. Positive self-image had a significant positive effect on attitude ($\beta = 0.51$, $P < 0.001$). Thus, **H6** was

Predictive Relevance Analysis

Cross-validated redundancy (Q^2) assesses the inner model's predictive relevance. Q^2 uses a sample re-use technique, which removes a part of a data, estimates the model parameters, and predicts the removed part using estimates. The model's predictive accuracy is higher when the difference between predicted and original values is smaller. Q^2 greater than zero is indicator of predictive relevance, q^2 : 0.02, 0.15, 0.35 for weak, moderate, strong degree of predictive relevance of each effect (Hair, Ringle and Sarstedt, 2013). In this study, Q^2 values of attitude and support were computed using blindfolding procedure in SmartPLS 3. Q^2 of attitude and support was 0.25 and 0.25, respectively. These values indicate a moderate predictive relevance for attitude and support.

Mediating Effect Testing – Research Question 2

One key contribution of this study was an examination of the mediating role of senior managers' attitude in the relationship between age, career variety, tenure, education, involvement in IS projects, positive self-image, and senior managers' support level. In this research, the focus is on how senior managers' characteristics affect their decision to support MIS implementation which can be mediated by their attitude toward MIS implementation. In moderation analyses the focus is on interactions i.e, the interest is in whether the effect of predictor variables changes depending on another variable (i.e., the moderator) which is not

what this research is examining. In order to assess mediation in path models, the researcher examined the relationship of the direct link between two latent variable and the indirect link via the potential mediator variable (from the predictor to the mediator and from the mediator to the endogenous variable (Henseler and Fassott, 2010). Baron and Kenny (1986) suggested three main criteria to consider a variable as a mediator: (1) the impact of the independent variables (age, career variety, tenure, education, involvement in IS projects, and positive self-image) on senior managers' attitude is significant; (2) the impact of senior managers' attitude on support is significant; (3) when senior managers' attitude is excluded, the relationship between the independent variables and support changes significantly.

Table 33: Mediating Effects of senior managers' attitude toward MIS implementation between their characteristics, positive self-image and support; Attitude: senior managers' attitude toward MIS implementation; Support: senior managers' support toward MIS implementation; Education: senior managers' highest level of education.

	Hypotheses	β	T value	P value
Age→attitude→support	H7a	0.03	1.07	0.29
Career variety→attitude→support	H7b	0.11	4.29	<0.001
Tenure→attitude→support	H7c	-0.12	5.32	<0.001
Education→attitude→support	H7d	0.07	1.65	0.1
College degree→attitude→support		0.09	2.80	0.005
Prior involvement in IS→attitude→support	H7e	-0.14	5.47	<0.001
Positive self-image→attitude→support	H8	0.35	12.39	<0.001

Hypotheses analysis

This section examines the mediating role of senior managers' attitude to address Research Question 2. H7a-H7e and H8 were tested with the results as follow.

H7a proposes that senior managers' attitude mediates the relationship between senior managers' age and their support. Therefore, the mediating role of senior managers' attitude in the relationship between senior managers' age and support was examined ($\beta=0.03$, $P>0.05$). Thus, **H7a** was not supported. **H7b** proposes that senior managers' attitude mediates the relationship between senior managers' career variety and their support. Therefore, the mediating role of senior managers' attitude in the relationship between senior managers' career variety and support was examined ($\beta= 0.11$, $P<0.001$). Thus, **H7b** was supported. **H7c** proposes that senior managers' attitude mediates the relationship between senior managers' tenure and

their support. Therefore, the mediating role of senior managers' attitude in the relationship between senior managers' tenure and support was examined ($\beta=-0.12$, $p<0.001$). Therefore, **H7c** was supported. **H7d** proposes that senior managers' attitude mediates the relationship between senior managers' education and their support. Therefore, the mediating role of senior managers' attitude in the relationship between senior managers' education and support was examined ($\beta= 0.07$, $P>0.05$). Thus, **H7d** was not supported. However, attitude mediates the relationship between college degree ($\beta=0.09$, $p<0.05$) and support. **H7e** proposes that senior managers' attitude mediates the relationship between senior managers' involvement in IS projects and their support. Therefore, the mediating role of senior managers' attitude in the relationship between senior managers' involvement in IS projects and support was examined ($\beta= -0.14$, $P<0.001$). Thus, **H7e** was supported. **H8** proposes that senior managers' attitude mediates the relationship between senior managers' positive self-image and their support. Therefore, the mediating role of senior managers' attitude in the relationship between senior managers' positive self-image and support was examined ($\beta=0.35$, $P<0.001$). Thus, **H8** was supported.

Hypothesis summary

Table 34 summarises hypothesis testing of the structural model. **H1** and **H3** propose that age and tenure are negatively related to attitude. The results show that **H1** was not supported, but **H3** was supported. **H2**, **H4**, **H5**, and **H6** postulate that career variety, education, prior involvement in IS projects, and positive self-image are positively related to attitude. The results indicate that **H2**, **H3**, **H5**, and **H6** were supported, but **H4** was not supported. **H7a**, **H7b**, **H7c**, **H7d**, **H7e**, and **H8** proposed that senior managers' attitude mediates the relationship between age, career variety, tenure, education, prior involvement in IS projects, positive self-image and support. The findings show that **H7a** and **H7d** were not supported, but **H7b**, **H7c**, **H7e**, and **H8** were supported.

Table 34: Summary of Hypothesis Testing

Research questions	Hypotheses	Hypotheses results
RQ1: To what extent, do demographic characteristics of senior managers and their personality traits impact their attitude toward MIS implementation?		
Direct effect	H1 Senior managers' age has a negative impact on their attitude toward MIS implementation.	Not supported
	H2 Senior managers' career variety has a positive impact on their attitude toward MIS implementation.	Supported
	H3 Senior managers' tenure has a negative impact on their attitude toward MIS implementation.	Supported
	H4 Senior managers' education has a positive impact on their attitude toward MIS implementation.	Not supported
	H5 Senior managers' involvement in IS projects has a positive impact on their attitude toward MIS implementation.	Supported
	H6 Senior managers' positive self-image has a positive impact on their attitude toward MIS implementation.	Supported
RQ2: To what extent does senior managers' attitude mediate the impact of demographic characteristics of senior managers and their personality traits?		
Mediating effect	H7a Senior managers' attitude mediates the relationship between senior managers' age and their support.	Not supported
	H7b Senior managers' attitude mediates the relationship between senior managers' career variety and their support.	Supported
	H7c Senior managers' attitude mediates the relationship between senior managers' tenure and their support.	Supported

Research questions	Hypotheses	Hypotheses results
	H7d Senior managers' attitude mediates the relationship between senior managers' education and their support.	Not supported
	H7e Senior managers' attitude mediates the relationship between senior managers' involvement in IS projects and their support.	Supported
	H8 Senior managers' attitude mediates the relationship between senior managers' positive self-image and their support.	Supported

Open ended question analysis

At the end of the survey an open ended question was presented for the participants to answer. 25% of participants (100 participants) responded to this question which was 'What do you think is the most important factor that would make you implement management information systems in your organisation?' This open ended question was included to gain a more in-depth understanding of the factors that impact senior managers' decisions to implement MIS.

Content analysis is a replicable research technique to make valid interpretations from texts. Content analysis can be used to identify and document individuals' attitudes and views (Krippendorff, 2018). As such, it was particularly useful to reveal senior managers' attitude and thoughts regarding MIS implementation. Neuendorf (2002) defines basic content analysis as a technique using word counts to determine the relative importance of specific content. Based on the content analysis using Nvivo 12 as the qualitative software, it is observed that the most reported words are decision and information with 25 and 24 counts following by controlling, data, efficient, and effective (see Table 35). For the full table please see Appendix H. Findings show that senior managers choose to implement MIS because it helps them with their decision making since it provides them accurate data and consequently it helps their efficiency and productivity. These findings are in line with Padek *et al.* (2018) and Thiesse *et al.* (2015) whose findings confirm that senior managers implement MIS because of what it can provide. These findings are in line with the literature (e.g., Beheshti (2006); Vieru and Ruvard (2014)) that MIS is designed to help managers and employees by processing very large quantities of information and providing managers with essential information regarding cost and

operations related to an organisations' competitive position (Beheshti, 2006) so that managers can make better strategic decisions (Vieru and Rivard, 2014).

'Information' was the second highest repeated word when the participants mentioned the reasons that they decide to implement MIS. This finding is similar to Elbahri *et al.* (2019) pointing out that MIS enable organisations to collect business information from different departments in a single data repository and generate reports to facilitate business procedures, which consequently result in price reduction, saving time, increased productivity, and better customer service. 'Efficient' and 'effective' were among the five highest frequent words which is in line with Beheshti' (2006) study proposing that MIS enables organisations to update or reengineer their business processes by identifying areas of operations which need improving and thus produces higher profitability and efficiency (Beheshti, 2006). MIS allows organisations to decrease the cost of their inventory and provide better management of customer relationships and the supply chain. Charamis (2018) also highlight that MIS improve organisational performance and responsiveness by highlighting inefficiencies and enabling appropriate resource allocation, which can help organisations maintain and improve their profitability.

Table 35: Word count frequency of the most frequent words using Nvivo 12

Word	Count	Weighted Percentage (%)	Similar Words
decision	25	5.64	decision
information	24	5.42	information, informed
controlling	15	3.39	control, controlling
data	13	2.93	data
efficient	12	2.71	efficiency, efficient, efficiently
effective	12	2.71	effective, effectively, effectiveness
improve	11	2.48	improve, improved, improvement, improves, improving
operations	10	2.26	operation, operational, operations
time	9	2.03	time, timely
productivity	8	1.81	production, productivity
planning	7	1.58	planning

support	6	1.35	support
performance	6	1.35	performance, performs
accurate	5	1.13	accurate, accurately



Figure 5: Word cloud made by Nvivo showing the most frequent words used in response to the open ended question

Concluding discussion

The first research question sought to determine the impact of age, career variety, tenure, education, involvement in IS projects, and personality traits on senior managers’ attitude toward MIS implementation. To answer RQ1, five hypotheses were proposed and examined and it was found that senior managers’ characteristics do predict a significant proportion (42%) of the variance in their attitude toward MIS implementation.

The first hypothesis proposes that senior managers’ age is negatively related to their attitude toward MIS implementation. The findings showed that age did not have a significant negative effect on attitude. The literature (Hambrick and Mason, 1984; Barker and Mueller, 2002; Hiebl, 2014; Serfling, 2014; Wang *et al.*, 2016) shows mixed empirical findings for the impact of age. For example, CEO’s age is negatively related to

R&D spending (Barker and Mueller, 2002; Serfling, 2014), their risk-taking (Serfling, 2014); Hambrick and Mason, 1984), innovation (Hiebl, 2014), and stock return volatility (Serfling, 2014). A possible explanation for this might be that with the scale of technology changes and competition intensity being more rapid in the modern economy younger senior managers may be more comfortable with risk taking and product innovation. Conversely, Wang *et al.* (2016) found that age is positively related to future firm performance. The explanation for this result may be due to other factors having an effect on this relationship. For example, older senior managers might have a stronger network and better access to resources, which may result in better firm performance. These studies are different to the findings of this study because they looked at the relationship between risk taking, innovation, firm performance and age while this study looked at the relationship between age and attitude. Due to the lack of studies investigating the impact of senior managers' age on their attitude, the researcher went on to study its impact on attitude and found that age was not a statistically significant predictor of attitude. Given the fact that age was not a significant predictor of attitude, it would seem that it is not a contributing factor toward attitude, therefore practitioners can focus more on other characteristics such as tenure, career variety, level of education, involvement in IS projects, and positive self-image rather than age.

The findings of this study are aligned with the findings of (Quazi and Talukder, 2011; Barzekar and Karami, 2014; Wang *et al.*, 2016) who suggest that age is not related to employees' attitude (Quazi and Talukder, 2011), firm strategic action (Wang *et al.*, 2016), and computer usage (Barzekar and Karami, 2014). Contrary to expectation, senior managers' age did not predict their attitude. Older managers are just as likely to have a positive attitude toward MIS implementation as younger ones. This rather contradictory result may be due to the fact that an individual's age is an inherent characteristic and a natural progression which may not necessarily be associated with people's perception and attitude toward MIS implementation. This finding is counter to age stereotypes that older senior managers are more risk averse as suggested by (Hambrick, 2007). It could therefore be suggested that in general the preferences of older senior managers should not be speculated upon.

The second hypothesis proposes that senior managers' career variety is positively related to their attitude toward MIS implementation. Career variety had a significant positive effect on attitude. This result seems to be consistent with other research which found senior managers' prior career experience has a positive impact on future firm performance (Wang *et al.*, 2016), firm strategic actions (Hambrick, 2007; Wang *et al.*, 2016), firms' financial restatements (Besar *et al.*, 2017), firm growth (Hambrick and Mason, 1984), and firms' innovation effort (Loukil *et al.*, 2010). The findings illuminate some of the unanswered questions related to

predictors of senior managers' attitude toward MIS implementation. Consistent with expectations, senior managers with high levels of career variety are more supportive of MIS implementation because they perceive novel options as being more possible and have a more positive attitude toward strategic situations. It is suggested that researchers working on the Upper Echelon Theory should use career variety to measure prior career experience because this construct not only considers job functions that senior managers did before, but also reflects prior industries in which they worked. It is believed that career variety gives a clearer picture about senior managers' previous career experience. This finding has important implications for organisations hiring new senior managers to be open to hiring someone with a very varied employment background rather than recruiting senior managers with work experiences that are only closely related to their current field (Bratton and Gold, 2017).

The third hypothesis proposes that senior managers' tenure is negatively related to their attitude toward MIS implementation. Tenure was found to have a significant negative effect on attitude. Empirical findings from other studies related to senior managers' tenure were varied with some studies finding that CEO tenure is positively related to R&D spending (Barker and Mueller, 2002), behavioural integration (Simsek, 2007), retention of the acquired company (Bergh, 2001), firm strategic actions and future firm performance (Wang *et al.*, 2016). It seems possible that these results are due to senior managers' growth of power as their tenures increase (Hambrick and Fukutomi, 1991). The finding of this study broadly supports the work of other studies in this area that CEO tenure is negatively related to both organizational citizenship behaviour and turnover intention (Kim, 2018), strategic choices (Hambrick and Mason, 1984), strategic experimentation and change (Finkelstein and Hambrick, 1990), and innovation and/or sophisticated management accounting and control systems (Hiebl, 2014). These results are likely to be related to senior managers' greater resistance to change and risk averseness when they are long-tenured. The finding of this study confirms that long-tenured managers have a more negative attitude toward MIS implementation and are less supportive during the implementation process. This finding has important implications for organisations during the recruitment process. According to Lepak and Snell (2002), a rational choice process to recruit someone for jobs that require candidates who are highly skilled and have exceptional knowledge are better done by internal recruitment to build a committed workforce. It is suggested that although long-tenure managers are more valuable to keep (Bergh, 2001), organisations should consider recruiting senior managers externally to increase the chance of successful MIS implementation.

The fourth hypothesis proposes that senior managers' education is positively related to their attitude toward MIS implementation. Out of all the educational levels only having a college degree was found to have a

significant positive effect on a senior manager's attitude. This result has only been described once before by Barker and Mueller (2002) where they looked at education as a series of dummy variables rather than a continuous variable. Most studies investigating CEO education showed that education is positively related to attitude toward an innovation (Hambrick and Mason, 1984; Quazi and Talukder, 2011; Loukil, Yousfi and Cheikh, 2020), open innovation in SMEs (Ahn, Minshall and Mortara, 2017), CFOs' compensation command (Datta and Iskandar-Datta, 2014), future firm performance (Wang *et al.*, 2016), firm strategic actions (Wang *et al.*, 2016), firms' financial restatements (Besar, Ali and Ghani, 2017), more suitable to imbricate with IT (López-Muñoz and Escribá-Esteve, 2017). These findings may be explained by

the fact that senior managers' education may help them to identify opportunities more easily. The finding of this study shows that education has no significant impact on a senior managers' attitude beyond the attainment of a college degree. Having a college degree helps senior manager's attitude toward supporting MIS implementation. A possible explanation for this might be that higher education has a positive impact on cognitive and non-cognitive skills of an individual (Barone and van de Werfhorst, 2011). Higher-order cognitive development is defined by critical reasoning, decision-making, question asking, and problem solving (Zoller, 2012). An implication of this finding is that organisations should be more open to recruiting senior managers who only have a college degree rather than adopting the strategy of companies who use the talent pool strategy which encourages hiring only 'the best' (Stahl, Miller and Tung, 2002), and not restricting themselves to the idea that 'more jobs require a degree or higher qualifications' (Bratton and Gold, 2017, p.141).

The fifth hypothesis proposes that senior managers' prior involvement in IS projects is positively related to their attitude toward MIS implementation. Involvement in IS projects had a significant negative effect on attitude. This finding is contrary to previous studies which have suggested that user involvement is positively related to system success (Harris and Weistroffer, 2009), IS enablement for organizational change and organizational learning (Palanisamy, 2001), management information system effectiveness (Le *et al.*, 2020), project performance (Hermano and Martín-Cruz, 2016), and firm's progressive use of IT (Jarvenpaa and Ives, 1991). Contrary to expectations, being involved in more IS projects does not necessarily lead to having a more positive attitude towards implementing new MIS. The finding of the present study shows that when managers have more experience in implementation projects, they show a less positive attitude toward MIS implementation, which consequently results in them being less supportive toward implementation. According to King (2003), thirty percent of IT projects fail. Therefore, the probability of a senior manager facing a project failure is higher when involved in more projects. The outcomes of project failure can lead to

strong reactions such as disappointment (Shepherd, Haynie and Patzelt, 2013), grief (Shepherd, 2009), and devastation (Eggen *et al.*, 2006). These negative emotions can lead to a less positive attitude toward MIS implementation. Therefore, a senior manager who has been involved in more IS projects, does not necessarily make them more suitable for a particular position especially if there is a proposed MIS implementation. This has an implication for recruiters when hiring a new senior manager to consider applicants with less involvement in IS projects. This finding has important implications for developing the Upper Echelon Theory by including prior involvement in IS projects as a predictor of senior managers' attitude. The findings also have implications for researchers to include prior involvement in IS projects when investigating senior managers' behaviour.

The sixth hypothesis proposes that senior managers' positive self-image is positively related to their attitude toward MIS implementation. Positive self-image did indeed have a significant positive effect on attitude. In accordance with the results in this study, previous studies have demonstrated that positive self-image is positively related to a firm's strategic actions (Wang *et al.* 2016), job satisfaction (Judge *et al.* 2003), job performance (Judge *et al.* 2003), life satisfaction (Judge *et al.* 2003), speed of a firm's strategic decision-making (Hiller and Hambrick, 2005), centralisation of a firm's strategic decision-making (Hiller and Hambrick, 2005), motivation and performance (Erez and Judge 2001) and a firm's performance (Hiller and Hambrick, 2005). The possible explanation for these results may be that senior managers who have a positive self-image and acknowledge their ability to affect their environment are more likely to get involved in strategic actions, possibly because of their ambition and confidence (Hiller and Hambrick, 2005). The findings of this study show that if a senior manager has a positive self-image, they are more enthusiastic about implementing MIS. Therefore, for UET researchers, the implication is to use a direct approach to measure positive self-image and use item-parcelling which provides more stable estimates and a more efficient model (Matsunaga, 2008). The findings also have implication for recruiters to use some psychometric tests to evaluate an applicant's positive self-image.

In terms of effect size, this study is comparable to similar studies that investigate the impact of senior managers' characteristics. For example, Barker and Mueller (2002) reported that CEOs characteristics (i.e., age, tenure, level of education, prior career experience) explains 14% of the variance in R&D expenses. This study found that senior managers' characteristics (i.e., tenure, career variety, level of education, prior involvement in IS projects, and positive self-image) explains 43% of the variance in their attitude toward MIS implementation. The results of regression analysis and PLS-SEM are almost the same and show a similar effect size.

Five hypotheses were generated and examined to answer the second research question which concerns the mediating role of senior managers' attitude. The findings show that senior managers' attitude mediates the relationship between career variety, tenure, prior involvement in IS projects, college degree and support. However, attitude has no significant mediation role between age, education, and support. These findings seem to be consistent with other research which found that perceived IT beliefs impact intention through attitude formation (Lam, Cho and Qu, 2007) and attitude partially mediates the relationship between reasons and purchase intentions (Tandon *et al.*, 2020). When an individual has stronger beliefs about something, they have a more positive attitude which therefore impacts how they perform a specific behaviour and this may explain the mediating role of attitude.

This finding has important implications for gaining a holistic perspective of the underlying process of a senior managers' support toward MIS implementation. According to Holton *et al.* (2007), many organisations hire employees for their attitude. Considering the findings in this study, attitude is therefore an important factor to consider in the recruiting process. The implication for organisations is to recruit senior managers who have a more positive attitude toward organisational changes. The findings confirm that a senior managers' positive attitude facilitates their support toward MIS implementation and the inference for managers is to have more positive attitude toward organisational changes such as implementing a new MIS. For researchers the findings suggest that they should examine the mediation role of attitude rather than only focusing on causal-effect investigations. The present study advances UET by clarifying the relationship of senior managers' attitude toward implementation and their characteristics through the findings showing that senior managers' characteristics predict their attitude.

Decision making, information, efficiency and effectiveness were among the top reasons to implement MIS that the participants mentioned in the open ended question. These findings leads to further investigation of the values of MIS implementation for manufacturers. Semi-structured interviews allow this by asking related questions.

Chapter 4: Study 2 (Qualitative Study)

Introduction

The objective of this thesis is to investigate the impact of senior managers' attitudes as contributing factors to their support in MIS in UK manufacturing organisations. The first aim is to measure how the influences of demographic characteristics of senior managers (including age, career type, tenure, education, involvement in IS projects) and how senior managers' personality traits influence/affect their attitude toward MIS implementation. The first research question was to find out to what extent, do the demographic characteristics of senior managers and their personality traits impact on their attitude toward MIS implementation. The findings of the first study showed that personality traits of senior managers have a very significant impact on their attitude toward MIS implementation which took the direction of the study toward adopting a psychological approach. Furthermore, the findings of the open ended question lead to further investigation of the values of MIS implementation. Therefore, in the second study, it was decided to employ a qualitative method in order to gain more insightful in-depth data. Interviews are one of the most widely used data collection methods in qualitative psychology research (Howitt, 2016).

In this chapter, the method that was adopted for the purpose of this part of this study is discussed. The interview protocol is described in detail. The method to analyse the qualitative data is presented and the findings are reviewed. Triangulation was used to check the validity of the interpretations derived from the quantitative data by including the data from in-depth semi-structured interviews with board level senior managers from the UK manufacturing organisations. According to Bryman (2008), triangulation might reduce the chances of reaching false conclusions by drawing data from different sources that have very different potential threats to validity.

Method

Participants demographics

91.7% of interviewees were male and half of the interviewees were between 45 to 54 years old. 50% of interviewees had Masters' degree or higher and 50% of the interviewees had 3 to 5 years of tenure (see Table 36).

Table 36: Demographic characteristics of interviewees including gender, age, highest level of education, and tenure (N=12).

Demographic categories	Frequency	Percentage (%)
Gender		
Male	11	91.7%
Female	1	8.3%
Non-binary	0	0%
Age		
18-24	0	0%
25-34	1	8.3%
35-44	4	33.3%
45-54	6	50%
55-64	1	8.3%
65+	0	0%
Education		
No formal qualification	0	0%
Diploma	1	8.3%
College degree	1	8.3%
University first degree	4	33.3%
Master's degree or higher	6	50%
Tenure		
Less than 1 year	0	0%
1-2 years	2	16.7%
3-5 years	6	50%
6-9 years	0	0%
10-14 years	2	16.7%
15+ year	2	16.7%

Descriptive statistics

The companies of 91.7% of interviewees were located in England and 75% of companies were other manufacturing. 41.7% of interviewees were from companies with more than 10,000 employees and 66.7% of interviewees were from companies with more than £25 million annual turnover (see Table 37).

Table 37: Descriptive statistics of interviewees including company location, nature of their business, number of employees and annual turnover (N=12).

Variable	Frequency	Percentage (%)
Company location		
Scotland	0	0%
Wales	1	8.3%
Northern Ireland	0	0%
England	11	91.7%
Nature of business		
Manufacture of food products	0	0%
Manufacture of beverages	0	0%
Manufacture of tobacco product	0	0%
Manufacture of textiles	0	0%
Manufacture of wearing apparel	0	0%
Manufacture of leather and related products	0	0%
Manufacture of wood and of products of wood and cork; except furniture; manufacture of articles of straw and plaiting	1	8.3%
Manufacture of paper and paper products	0	0%
Manufacture of coke and refined petroleum products	0	0%
Manufacture of chemicals and chemical products	0	0%
Manufacture of basic pharmaceutical products and pharmaceutical preparations	0	0%
Manufacture of rubber and plastic products	0	0%
Manufacture of other non-metallic mineral products	0	0%
Manufacture of basic metals	0	0%
Manufacture of fabricated metal products; except machinery and equipment	0	0%
Manufacture of computer; electronic and optical products	1	8.3%
Manufacture of electrical equipment	0	0%
Manufacture of machinery and equipment n.e.c.	1	8.3%

Variable	Frequency	Percentage (%)
Manufacture of motor vehicles; trailers and semi-trailers	0	0%
Manufacture of other transport equipment	0	0%
Manufacture of furniture	0	0%
Other manufacturing	9	75%
Company age		
less than 5 years	1	8.3%
5-10 years	3	33.3%
10+ years	8	66.7%
Number of employees		
1-4	1	8.3%
5-49	2	16.7%
50-249	2	16.7%
250-1,000	2	16.7%
1001-5,000	0	0%
5,001-10,000	0	0%
10,000+	5	41.7%
Company annual turnover		
Less than £500k	2	16.7%
£500-£999k	0	0%
£1m-£5m	1	8.3%
£6m - £10m	0	0%
£11m - £15m	1	8.3%
£16m- £25m	0	0%
More than £25m	8	66.7%

Measurement instrument: Interview protocol

Participants were given a short survey about their demographics which was hosted on Google docs. The link to the survey was emailed to the participants before the interview. The interview started with some general questions about the interviewees' career path and their experience regarding MIS including ERP, CRM, and SRM. More detailed questions were then asked regarding benefits and challenges of MIS and the interviewees' opinion regarding MIS implementation and future of MIS. To capture their positive self-image, a brief explanation of the term was given and they were invited to talk about their perception of themselves as a manager and their colleagues perception of them as a manager. The interview was concluded by asking if they had any other points that they wanted to add. Interviewees were also encouraged by the researcher to expand or clarify some of their answers. Semi-structured interviews allow a degree of flexibility to generate

an understanding and explanation of interviewees' opinions regarding important issues, patterns and events (Grube and Wynn, 2019) of MIS implementation.

Data collection procedure

The search for potential interviewees was a difficult process and resulted in many rejections. On 8-12th November 2021, the researcher attended the 'Digitalising Manufacturing Conference' in Liverpool which is manufacturing industry's largest digital manufacturing exhibition in the UK hosting 3,000 manufacturers (The Manufacturer, 2021a). This specific conference was chosen as it is the largest exhibition in the UK and manufacturers attending it are interested in digitalisation. Before data collection, a human research ethic approval was obtained. This research was approved on 22 October 2021 (reference: 32637-LR-Oct/2021-34559-2) by the Research Ethics Committee of Brunel University. For maintaining the validity and the authenticity of this research, the researcher ensured the willing consent of the participants for which the researcher provided a consent form to them highlighting the details of the research including the purpose, scope and the aim for maintaining the level of transparency. The consent form also informed the participants of the beneficence of the research. The researcher also ensured the proper handling of the data in order to maintain the confidentiality of the data collected along with ensuring the proper use of labelling to maintain the privacy of the participants. The interviews were recorded with consent of the interviewees and all the records were deleted after transcription. Out of 60 senior managers contacted to participate in an online interview, 12 of them accepted the invitation. According to Baker and Rosalind (2017), the attainment of a sufficient number of interviews cannot be set at a certain number for qualitative research. Achieving saturation is crucial to gain new knowledge through additional interviews. In this research, there appeared to be a degree of saturation with the eleventh interview, since no new knowledge emerged. The interviews were conducted on Teams and Zoom between November- December 2021 and January 2022, each interview was approximately 45 minutes long. The time and online platform of the interviews were chosen by common agreement.

Data analysis

A thematic analysis was chosen to analyse the data because it offers flexibility, generates unanticipated insights, and allows psychological interpretations of data (Braun and Clarke, 2006). This is important in this research since the findings of the first study showed that psychological attributes of senior managers are one of the main factors impacting their decision-making to implement MIS (explaining 51.7% variance in senior managers' attitude toward MIS implementation see Figure 3). Thematic analysis consisting of six phases was carried out following Braun and Clarke's (2006) guidelines. In the first phase, the researcher familiarised

herself with the data by transcribing, reading, and re-reading the data. In the second phase, initial codes in the data set were identified by highlighting the transcription to identify segments of data to indicate potential patterns. Interviewees' statements were manually coded to recognise and interpret connections (Bryman and Bell, 2007). The third phase was to search for themes across all the data set which involved interpreting and categorising pieces of data into theme-based patterns (Dittmar and Drury, 2000). In this phase, the codes were analysed to consider how various codes may combine to form an overarching theme. Some codes were formed main themes, whereas other form sub-themes (themes-within-a-theme). A separate table containing themes, sub-themes, and codes for each interview was generated at this phase.

In the fourth phase, all the generated themes and sub-themes were reviewed to verify that they agreed with the coded extracts and the whole data set. Two levels of reviewing and refining the themes were conducted at this phase. In the first level, the researcher checked if each theme appeared to form a coherent pattern. When the candidate themes appeared to form a coherent pattern, the researcher moved on to the second level. If the candidate themes did not fit, the researcher reworked the theme, by either creating a new theme, finding a home for the codes that did not work in the existing theme, or discarding them from the analysis. The second level was a similar process but in relation to the entire data set. The researcher considered if the created themes were accurate representation of the whole data set. Clear names and definitions for each theme were generated in the fifth phase. Sub-themes were used to give structure to a particularly complex and broad themes and to demonstrate the order of meaning in the data. For example, the researcher identified seven key themes: 'implementation challenges', 'benefits of MIS', 'Decision making process to implement MIS', 'Reasons to upgrade', 'Education profile', 'Personality traits', 'Interpersonal relationships'. Within each theme, some sub-themes were identified: for implementation challenges, six sub-themes were identified including 'cost', 'Staff challenges', 'Organisational challenges', 'General challenges', 'Pre-implementation challenges', 'Post-implementation challenges'. These final themes and sub-themes resulted from a refinement process of initial themes and sub-themes (see Table 38). The 'key themes' were generated because they captured something important regarding the overall research question. According to Braun and Clarke (2006), the key themes do not necessarily need to be the most prevalent themes across all the interviews. In this analysis, prevalence was counted as the number of different interviewees who articulated the theme. In the final phase, a report of the analysis was written. In order to ensure reliability, a second coder with experience of coding and expert in the field MIS, reviewed the themes generated from the second phase and the final report and they concluded that the findings were reliable.

Results

Out of all the themes emerging from the data, there were seven broad themes relevant to the research questions including 'Implementation challenges', 'benefits of MIS', 'decision making process to implement MIS', 'reasons to upgrade', 'education profile', 'personality traits', and 'interpersonal relationships' (see Table 38). Therefore, these are the ones that will be discussed further. Some of the other themes that emerged from the data are beyond the scope of the current research. For full details of themes and subthemes found, see Appendix .

Table 38: Main themes, sub-themes, codes, and participant examples emerged from 12 interviews with senior managers from UK manufacturers.

Themes	Sub-themes	codes	Participants example
Implementation challenges	Cost	-Expensive consultancy -Costs of the training -Investment in the initial infrastructure	'consultancy is very expensive and you want to limit the financial burden' [P1]. 'the hidden costs of the training and getting people up to speed is very challenging' [P5]
	Staff challenges	-Training quite confusing -Employees resentment -Having to re-learn new things	'I think we actually found the training quite confusing' [P4]. 'the employees resent it thinking that they got to lose their jobs' [P2]. 'People, of course with tonnes and tonnes of years of experience having to re-learn new things and sometimes having the time to do that is really important' [P3].
	Organisational challenges	-Difficult to implement operationally in an effective way -Cultural change -Company doesn't have the functions in place that are necessary	'It's difficult to implement operationally in an effective way and because of that complexity' [P4]. 'It's a cultural change within a business for a lot of people' [P5].
	General challenges	-Time consuming -Not very flexible	'It takes time' [P12].
	Pre-implementation challenges	-proper implementation plan -setting expectations -scope of the project	'Having a proper implementation plan is critical' [P1]. 'The main issue that I understand in implementation like this, is

Themes	Sub-themes	codes	Participants example
			setting expectations because both you and the customer, but primarily the customer, doesn't really understand what he's getting into it' [P6].
	Post-implementation challenges	<ul style="list-style-type: none"> -Upgrade the system -New ways of working -Not making any decisions from that data -It takes a long time and effort to see the benefit 	<p>'have to upgrade the system to a more complex manufacturing system' [P9].</p> <p>'The challenge often requires new skills, new attitudes, new ways of working, often new ways of collaborating across the business' [P12].</p>
Benefits of MIS	General benefits	<ul style="list-style-type: none"> -Track the decisions -Efficiency -More control over the process -Paperwork process is actually automated -Growing business 	<p>'which allows us to keep track of productivity, efficiency and stock control and things like that' [P9].</p> <p>'The benefits are it offers more control over the process' [P8].</p>
	Customer benefits	<ul style="list-style-type: none"> -Helps build that relationship with customers -Having access to all the functional parts of a business relationship 	'I think it's very good for base data having access to all the functional parts of a business relationship' [P3].
	Financial benefits	<ul style="list-style-type: none"> -Saving money -Understanding budgets 	'Understanding budgets profit and cost centers the standard profit and loss. Balance sheet' [P6].

Themes	Sub-themes	codes	Participants example
Decision making process to implement MIS	Factors to choose from different MIS	-Cost -Usability -Competitors	'So three of us within the senior leadership team would test the software and compare notes on it. We'd look at competitors. So, I'd say cost, usability and probably competition. When I say competition I also mean, what's the industry standard so what are others using and in the space' [P4].
	Reasons to implement	-Being familiar with the system -External knowledge -Benefits would outweigh the challenges	'We started with QuickBooks because I was familiar with that coming from the States [P9].' 'one of our directors read this in a textbook or at some kind of seminar or something and then decided we should do it' [P11].
Reasons to upgrade		-Faulty -Did not provide or have abilities needed to manage and run the business effectively. -Background updates and software updates to make the system more efficient -Got to adapt and change when we see those benefits	'I think upgrading to new systems if the existing system is faulty you need to upgrade' [P12]. 'It's nice to keep the package view the same, but background updates and software updates to make the system more efficient that's pretty good' [P5].
Education profile	Academic background	-MIS actively being taught, and rightly so - A better understanding of the holistic approach	'Academic education to brings some sort of process oriented mindset and approach' [P10]. 'Academic education teaches you how to manage an extreme number of variables' [P9].

Themes	Sub-themes	codes	Participants example
	Vocational background	-Professional qualifications -in the field	'I 'm not sure that's directly linked to my education, but it's gone as systems thinking and being able to conceptualise those kind of skill sets' [P11].
Personality traits	Self-worth	-Be relied on -A good manager	'Somebody who delivers, so somebody who can be relied on to do something to get something done. Somebody who's very passionate' [P4].
	Emotional stability	- More driven by emotion -Quite intense	'It also means that you're more driven by emotion and feeling rather than process and rational reflection so that's what I would call it' [P4].
	Self-efficacy	-Ensure I reach my goal - I fight for them	'I know what I want to achieve and I'm taking the steps or the necessary steps to ensure I reach my goal so it's a personal individual goal' [P8].
	Locus of control	- Things just do go wrong -Have to wow the customer	'I take these things we try to do very seriously and there's things that always sneak in, that go wrong. There are many things that can fail when you do anything. And a lot of times that's a reality of life that things just do go wrong and things don't work out exactly as you expect, etc. That's the way life is. But that doesn't mean that we shouldn't adopt and fix it and make it right. We shouldn't wait until next week to do it. We should do it now. I think that's what I

Themes	Sub-themes	codes	Participants example
			mean when I say I have an intense focus on making sure things work as they should' [P12].
	Positive characteristics	-Dependable -Inspirational -Open -Honest -Knowledgeable	'I think they see me as dependable and inspirational [P9].' 'Good source of information' [P1].
	Negative characteristics	-Impatience -Intense	'There could be periods where I'm intense. I work with a sense of urgency around what I do [P12].'
	Supportive	-empowers -encourages	'I like to convey myself as somebody that empowers and enables my staff so I'll encourage them and guide them how to solve a problem' [P1].
	Drivenness	-Goal oriented -Ambitious	'If I have a goal and I want to achieve something I don't like, not to achieve it' [P12].
	Sociability	-Feel comfortable coming to me -Know everybody	'I'm probably one of the only people in the room that actually knows everybody else in the room or the vast majority of people' [P11].
	Open minded	-Open to new ideas -Evolving person to my environment	'Keen on changing or implementing changes in order to improve the business and achieve its objectives' [P8].
	Creative	-Madman -Full of ideas	'Talk to them about is all about creating new ideas, crazy things that we can do' [P9].

Themes	Sub-themes	codes	Participants example
	Ethically minded	-fundamentally ethically wrong -caring for environment	'how much an impact on the planet are we now doing' [P2].
Interpersonal relationships	Straightforwardness	-Fairly blunt -Direct person	'By nature, I am a fairly blunt and direct person' [P7].
	Compliance	-Willing to take on conflicts and solve them -Caring -Good communicator -Team player	'Very willing to establish clarity even in topics that are normally difficult to discuss' [P12]. 'Communicating with them in the correct way' [P5].

Interviews findings are discussed in more detail below, interviewees will be referred to 'P' with a number for example [P1] means participant 1:

Implementation challenges and benefits

'Implementation challenges' and 'benefits of implementation' were themes that emerged when participants were asked about their attitude toward MIS implementation. Whilst all interviewees mentioned challenges around MIS implementation, the majority of them agreed that benefits of MIS outweighs challenges of implementation, which suggests senior managers' positive attitude toward MIS implementation. This viewpoint is exemplified by these senior managers:

'The implementation of that I'd say has been difficult but the benefits of it outweigh those kinds of stresses' [P4].

'The implementation process itself was painful, but SAP as a tool is great if it's implemented properly' [P8].

I've been involved in a variety of situations where management information systems were either necessary to implement from scratch or where it was necessary to enhance and improve existing management

information systems ...' and When it's well done an implementation of the management information system can be very, very, very valuable strategically, as well as operational, in terms of ongoing performance [P12].

However, one particular interviewee when asked about his experience while using MIS was particularly critical of MIS and was of the opinion that organisations only use MIS to justify their decisions:

Most of the data driven decisions we've made with the data have been very selectively chosen data to give a conclusion that they wanted to conclude. Most of the bits that I know more about and the way they present it to the wider business it's ridiculous. It's such a misrepresentation of the situation and they have cherry picked data to back up the case. I see that quite commonly and that's a problem with data driven stuff. What data do you choose? Most people don't do the thing of predefining what they're going to look at, and the datasets they're going to examine. They've come up with "I want to do this", and I want the data to back it up. That's how I see the implementation of most of our data driven systems they are just helping to justify decisions that have either already been made or that people are minded to do anyway [P11].

Decision making process to implement MIS

'Factors to choose from different MIS' and 'reasons to implement' were two sub-themes that emerged from the interviews. The sub-themes explain the decision making process of senior managers and were raised by three participants. Senior managers reported that they made their decisions to implement MIS based on their prior or external knowledge or on specific criteria including cost, usability, and their competitors.

One of the senior managers talked about choosing a specific MIS only because he was familiar with it: 'We started with QuickBooks because I was familiar with that coming from the States' [P9].

The same person also mentioned that the second time he chose a system it was only because his colleagues were familiar with it: 'I didn't look at all the different options but decided to choose SAGE based on the knowledge set of the people that were working for me at this time' [P9].

Another senior manager talked about being informed of the benefits of MIS was the reason they decided to implement: 'One of our directors read this in a textbook or at some kind of seminar or something and then decided we should do it' [P11].

While another senior manager mentioned all the criteria that they used to choose a specific system:

Cost was one of the major factors. Usability. So three of us within the senior leadership team would test the software and compare notes on it. We'd look at competitors. So, I'd say cost, usability and probably competition. When I say competition I also mean, what's the industry standard so what are others using and in the space [P4].

Senior managers' decision to support MIS implementation

When asked about their opinion on upgrading their MIS, the participants were unanimous in the view that they would upgrade their MIS if there is a need. This view is exemplified by these interviewees: 'I think upgrading to new systems if the existing system is faulty you need to upgrade. And sometimes that upgrade is about new technology, a new system for doing it' [P12].

I like IT systems so I'm all for the next new thing, but I think as a manager, I prefer to have still stability for a while. So, I like a package to be in place and to constantly use it for at least a year and a half before doing any kind of upgrades because it can confuse people or operators that use it every day. It's nice to keep the package view the same, but background updates and software updates to make the system more efficient that's pretty good [P5].

Another interviewee stated that they will probably be 'forced' to upgrade their system because the system was highly embedded in their process:

Good question. Click Ups - an interesting one. The project management tool we used. Upgrade? Probably not just because I'm not sure there's a business need for it right now. HubSpot CRM is an interesting one. I think we will probably be forced to upgrade because it's so embedded in our process. I think we probably would upgrade [P4].

One interview mentioned that people who have gone through the implementation process have learnt from previous experience and they know how to tackle certain challenges better:

I think here now it's already implemented, but if I was to start from scratch I would probably look at the cost and the challenges versus the benefits. I think the benefits would outweigh the challenges and I think you would have to go through the pain to reap the rewards. Well, obviously when people do that once and they go through the pain, obviously they've learned a lot from the previous experience and they know how to tackle certain challenges better [P8].

Senior managers' personality traits

Senior managers' self-esteem

Self-esteem demonstrates how an individual evaluates his self-worth (Rosenberg, 1965). A majority of interviewees expressed a high positive self-esteem while describing themselves, for example:

'I think I would describe myself as a business leader with years of experience across multiple manufacturing sectors. I'm ready to implement change and drive organisational goals' [P8].

'I see myself as a good leader there'[P2].

However, one particular interviewee did not seem to have a high level of self-esteem:

I'm not good at everything that I do. I have good people around me that make good decisions and I trust them with what they say and what they do. I just have basic general knowledge of most things to know when things look right or look wrong [P5].

They also believe that their colleagues think that they are 'good managers' which shows a high level of self-esteem. This viewpoint is exemplified by these interviewees:

'Somebody who delivers, so somebody who can be relied on to do something to get something done. Somebody who's very passionate' [P4].

I tell you what, people describe me as charismatic. I've got a lot of energy, I love speaking with people, I love people, I love new people, I love new experiences. I'm going back to that kind of concept of passion actually what that comes out with, with people is charisma because actually I'm just interested in people. I like working with people [P4].

'I think most of them [their colleagues] believe I'm a good manager. I have that feedback so you know, I have evidence to show that most of them believe that I'm a good manager, that I'm a good leader'[P6].

Senior managers emotional stability

Emotional stability is one's tendency to feel safe and calm (Judge, 2000). One particular interviewee showed low level of emotional stability and mentioned that he is 'influenced by people's emotions and by my own emotional state': 'It also means that you're more driven by emotion and feeling rather than process and rational reflection so that's what I would call it' [P4].

I suppose I'm quite driven by if there's lots of positive things going on I'm going to get super positive I could do more positive things. Whereas if there's kind of negativity and there's problems some of the time I get a bit bogged down and I'm a bit 'why is that happened, what's going on'. So, I suppose probably in a perfect world, although you know different strokes for different folks, you'd probably be a bit more rational and objective and task focused but the problem is I'm influenced by people's emotions by my own emotional state and I transfer that into the workplace some of the time [P4].

Overall two of the participants show high emotional stability but at certain times they can show low emotional stability:

Quite sharp sometimes. The feedback I've had on my 360 degree reviews have been positive in the most part. The constructive criticism I have received has been that I could temper my language at certain times. But it's clear to them that it's through frustration and just wanting things to be right rather than actually being derogatory towards them as individuals [P5].

Quite intense. When we're working on things, my style is quite commanding once we get into pressure situations. We do a lot of deadline driven activities so, I have a tendency to then tell people what to do [P11].

One of the interviewees expressed a high level of emotional stability:

I'll lead by wanting to show the virtue and to sort of build the trust and win the hearts and minds of those employees That's where good leadership comes in and it's about how to be calm and say less and allow them to do the talking and for them to be the champions [P2].

However, in one particular case one participant described himself not internally emotionally stable, but projecting emotional stability to their colleagues:

So one of the things that is tough is that you always have to be positive. OK, and I'm generally a positive person anyway, and just sort of lucky that our business is going well so it's easy to be positive when things are going well. But particularly over the last year, I've never seen so many people that have had personal problems, psychological problems, relationship problems, health problems. And as the Managing Director, it's your job to be the captain of the ship, and make sure that everything is OK whether you feel it or not [P9].

It's almost like a character you've got to play. You can be unsure and you can be nervous on the inside, but you can't show that. You've got to make sure that everyone else believes that things are going the right way. And sometimes it feels like you're pretending, but it's just the role you've got to play sometimes [P9].

Senior managers' self-efficacy

Self-efficacy refers to an appraisal of an individual's ability to perform successfully in situations (Judge, 2000). Most interviewees expressed a high level of self-efficacy, for example:

'I follow up on what I say. So, if I say something I will follow up and make it happen. I fight for them' [P6].

'I know what I want to achieve and I'm taking the steps or the necessary steps to ensure I reach my goal so it's a personal individual goal' [P8].

Senior managers' locus of control

Locus of control is a person's belief that desired outcomes are a consequence of one's behaviour not from fate (Judge, 2002). One specific interviewee expressed that 'there is no limit' with a can-do attitude:

We're opportunistic as a business, so when an opportunity comes up we want to be able to use the resources we can to seize opportunity for us and get ourselves into that opportunity. That's the kind of thing that people like about me is that there is no limit. There is no 'oh, we can't' you know I go 'let's get on and do it' and we've done amazing things because of that [P9].

Another interviewee mentioned that things do not always go in a way that is expected and 'that's a reality of life', but he explained that it would not stop him from adapting and fixing things which shows high level of internal locus of control:

I take these things we try to do very seriously and there's things that always sneak in, that go wrong. There are many things that can fail when you do anything. And a lot of times that's a reality of life that things just do go wrong and things don't work out exactly as you expect, etc. That's the way life is. But that doesn't mean that we shouldn't adopt and fix it and make it right. We shouldn't wait until next week to do it. We should do it now. I think that's what I mean when I say I have an intense focus on making sure things work as they should [P12].

Another interviewee indicated a partial control over things that happen: 'Lots of people see my job as quite fun and that means it's quite hard work trying to stay on top of situations and you're only at best partially in control of anything' [P11].

Senior managers' open mindedness

Two sub-themes emerging from personality traits included being 'open minded' and 'creative' which are similar to Openness to experience in the Big Five. People high on Openness to experience are curious, imaginative, creative, original, and they prefer variety rather than routine (Costa and McCrae, 1992). They also tend to look for novel ideas and new experiences. The majority of interviewees (9 out of 12 interviewees) expressed a high level of Openness to experience.

One particular interviewee stated that his colleagues call him 'a madman' because of him talking about new and 'crazy' things that they could do:

Well, it's funny we were out last night on a corporate event thing and they were saying that they see me as a madman [laughing]. That was the word that they used for me, because the stuff that I will talk to them about is all about creating new ideas, crazy things that we can do. Why don't we do this? Why don't we do that? It's never about what we used to do and never about what were you doing today, it's always about I've got this sort of thing. What if we did this? What if we did that? I think that they see me as the inspiration of the business rather than the sort of management of it as such [P9].

This view was echoed by another interviewee who stated that his colleagues would see him as a person who is 'keen' on changing: 'My colleagues would see me as a young, ambitious individual who is keen on changing or implementing changes in order to improve the business and achieve its objectives' [P9].

Another interviewee called himself 'a change agent' and stated that he also encourages his colleagues to explore new technologies:

Being a change agent is something that has been a thread throughout my career really, opening people into externalising to situations like this for example; come out and see what the latest innovations are in technologies don't just be satisfied with the status quo [P1].

Sociability

A recurrent subtheme in the interviews was 'sociability'. This sub-theme recurred throughout the dataset when interviewees were asked how they perceive themselves as a manager which is similar to the facets of extraversion in the Big Five and sociability (sociable and expressive) (Hogan and Hogan (2007). People who are extraverted are described as affectionate, talkative, active, passionate, and warm (Barrick and Mount,

1991; Costa and McCrae, 1992). A majority of interviewees stated that they believe they are approachable by their colleagues. This viewpoint is exemplified by these interviewees:

I think that they feel comfortable coming to me with any type of problem. It could be a personal problem and a professional problem and they always feel comfortable to come and speak to me on any level. So, I believe. I think I'm doing alright [P6].

'I'm probably one of the only people in the room that actually knows everybody else in the room or the vast majority of people' [P11].

Drivenness

Many researchers (e.g., Mount and Barrick (1995)) suggest that Conscientiousness (C) is composed of two primary aspects achievement motivation and dependability. 'Drivenness' may be equated to achievement motivation and thus it is linked to C in the Big Five. Achievement motivation has surfaced in the data while interviewees were describing themselves as a manager. They suggested that they are high in Conscientiousness. This view is echoed by an interviewee: 'My colleagues would see me as a young, ambitious individual who is keen on changing or implementing changes in order to improve the business and achieve its objectives' [P8].

Another interviewee also mentioned 'If I have a goal and I want to achieve something I don't like, not to achieve it' [P12].

Interpersonal relationships

Emerging from the interviews was the theme of 'interpersonal relationships'. This theme is similar to Agreeableness, which is an aspect of interpersonal behaviour, which is identified with modesty, trust, straightforwardness, alternance and compliance (Costa and McCrae, 1992). Two emerging subthemes from the interviews were 'straightforwardness' and 'compliance' with a number of interviewees suggesting that they are cooperative and ready to solve solutions, for example:

I'm very open and honest, I'm ready to work with other people and I find common ground and find solutions. I equally lead my team towards finding their own solutions so I have a coaching and mentoring ability as well, so obviously as a manager you're not expected to do everything by yourself you need to get results through others [P8].

That I'm very willing to take on conflicts and solve them. I'm very willing to establish clarity even in topics that are normally difficult to discuss. They [the interviewee's colleagues] will also say that I bring people along, in fact, I produce success in people that work with me [P12].

There were some suggestions that they could be 'direct' and 'fairly blunt', this viewpoint was echoed by this interviewee: 'By nature, I am a fairly blunt and direct person' [P7].

In response to the question that how the interviewee perceived himself as a manager, one stated that they were 'Transparent, honest, direct. I speak how things are'[P5].

Vocational background

Most interviewees expressed that having career variety has helped them to understand the benefits of MIS. This sub-theme came up for example in discussions of their viewpoint regarding the impact of educational background on their understanding of benefits of MIS. This view was echoed by an interviewee who stated that:

I think the benefit of my background is that I've been around the block and I've tried different functional areas. As well as working in the operational side I've also worked in executive and worked in executive management to deliver functional outcomes. Now, I'm working with bringing together entire teams of executive management, so I would absolutely say that my experience of being at the different levels of operations in the business and seeing the issues both from a perspective of being somebody who needs to implement a new management information structure or sub structure, someone who looks at it from a perspective of what change is needed to go from, bad management information to good management information [P12].

A number of interviewees commented that vocational experience is more important than formal education:

'What I'm trying to say is that experience is much more important than formal education, but I wouldn't underestimate the formal education because it gives you perspective' [P6].

I think it's not necessarily academic education it would be in the more vocational work based occupational training that I have had so things like lead management methodologies, continuous improvement tools, project management tools, ...[P1]

...we both worked at the bottom and we've [referring to the company's CEO] worked our way through a lot of the different levels of the organisation so we know it from the ground up... Seeing a function for example

like HR transformed when you implement a system that you know is significantly more efficient, you see those functions improve their delivery and certainly improve their cost of delivery [P7].

The same interviewee stated that their education is mainly through vocational experience and they did not go to university: 'My education has been largely in the field so I didn't go to university [P7].'

Academic background

A recurrent sub-theme in the interviews was a sense amongst interviewees that their educational background had an impact on understanding the benefits and challenges of MIS and their decision making process to implement MIS. They commented that their education has helped them to have a 'holistic', 'process oriented, and 'evidence-based' approach to make the decision to implement MIS:

P11 held a Bachelor's degree in Materials Chemistry and then moved on to a PhD in Surface Science, Surface Chemistry.

Yes, probably. I can certainly have a better understanding of the holistic approach and what the different stakeholders are going to want and require and where their pain points are going to be and where the benefits are going to be and trying to balance all of those things. I'm not sure that's directly linked to my education, but it's gone as systems thinking and being able to conceptualise those kind of skill sets [P11].

I believe it (referring to Mechanical engineering) was very useful because Mechanical Engineering defined a sort of process for everything you want to do in your life, in your job, in your career, in your activities with externals. It always brings some sort of process oriented mindset and approach to your activities and because of that I think Mathematics is always the foundation of all of the engineering courses, especially Mechanical Engineering, and that's always useful to think in that context that you need to put the equation into a very specific order to get to the final answer, and yes, I think that was very helpful actually for me [P11].

I think when you assess anything for its pros and cons you try and take a balanced, kind of evidence-based approach similar to one which I'd undertake as part of a research project or in terms of my skills as a researcher. Yes, I would say my educational background has an influence on both that process of assessment and final judgement [P4].

Another interviewee also commented that their education made them aware that information systems are needed to run a business:

When you get educated through college, university or any other courses, it opens your eyes to the fact that systems are a part of how a business needs to run and operate as a central location for holding information' and 'education helps you understand that there' s more than just what's in your own opinion in your own head. It opens your eyes a little bit [P5].

Two of the interviewees had various educational background including Economics, Business, and MBA. While one of them believed that his degree in Economics, Business, and MBA educated him in regards to the importance of MIS:

Yeah, I think so. I'm educated in Economics and in Business and in Languages. I think it's very clear they have. Economics and structures that exist in Economics and in Business models it's all about data and information coming together. You will find most MBA schools have specific modules around management information systems so it's actively being taught, and rightly so because of the importance of it as I've talked about [P12].

Another interviewee commented that they think their MBA degree is 'superfluous' and they did not get any benefit from it, however, this interviewee believes that their formal education gave them perspective:

Yes and no. I have a lot of education background. Some of it is relevant, some of it is less. For my Bachelor's Degree, I did Economics and Business Management. And then I did another degree in Software Engineering. Then I did my MBA. Now my MBA was completely superfluous. There's absolutely no benefit for me from my MBA. What I'm trying to say is that experience is much more important than formal education, but I wouldn't underestimate the formal education because it gives you perspective [P6].

[Concluding discussion](#)

In order to verify the results from Study 1 the in-depth semi-structured interviews were conducted. This study was designed to determine the impact of senior managers' demographic characteristics and personality traits on their attitude toward MIS implementation more comprehensively. Study 2 findings did validate, complement and extend Study 1 findings in a number of ways.

With respect to senior managers' decisions to implement MIS, some senior managers made their decisions based on their prior experience and knowledge, while one of them made their decision based on the evaluation of certain criteria. There can be two possible explanations for the difference between these

managers decision making approach. It is likely that the senior managers who made the decision based on their prior experience and knowledge made the decision under bounded rationality due to the high risk and challenges of MIS implementation in the UK manufacturing sector. The second explanation could be differences in their personality traits. According to the literature (e.g., Hiller and Hambrick (2005); Ployhart *et al.* (2014)), CEOs with a high level of positive self-image might be more confident and willing to make strategic decisions based on their prior career experience. This finding is important because it confirms that senior managers make their decisions based on their experience, beliefs and personality traits. This suggests that an individual may use limited rationality when acquiring and processing all the relevant information in difficult situations which then raises the issue of cognitive constraint (Taylor, 1975). Therefore, it seems that senior managers make their decisions based on their experiences and beliefs not necessarily on facts alone. This finding supports the Upper Echelon Theory which states that senior managers' experiences, values, and personality traits greatly impact how they interpret the situations they face, which in turn, influences their choices (Hambrick, 2007). This finding may help us to understand how senior managers make their decisions to implement MIS in their organisations, especially, in the UK context where the majority of organisations are SMEs with more limited access to financial resources. MIS implementation in this situation involves higher risk than in larger organisations with more budget to invest in MIS implementation. What the qualitative study revealed may indicate that senior managers personality traits have a stronger impact on their attitude in the UK manufacturing context which is in line with Study 1 findings which demonstrated that personality traits have the strongest impact on senior managers' attitude toward MIS implementation.

The results of Study 2 show that although all senior managers were aware of the challenges of implementation, they all agreed that benefits outweigh the challenges suggesting that they all had a positive attitude toward MIS implementation. According to the findings around senior managers' perception of themselves as a manager and their colleagues perception of them as a manager, it can be inferred that senior managers generally had a positive self-image. It is therefore likely that there is a connection between senior managers' positive self-image and their attitude toward MIS implementation which supports the findings of Study 1 which indicated that senior managers' positive self-image is the major predictor of senior managers' attitude toward MIS implementation.

These results are in agreement with previous studies (e.g., Wang *et al.*, (2016); Hiller and Hambrick, (2005)) that senior managers' personality traits impact their strategic choices. According to Hiller and Hambrick (2005), senior managers with high positive self-image 'are not only sure of the wisdom of their decisions per

se, but also sure of their abilities to successfully implement their decisions' (p. 311). Wang et al. (2016) found that CEOs, CSE and lack of emotional stability is positively related to firm strategic actions. The results of Study 2 suggested that the majority of interviewees have high positive self-image, however, some of them indicated lack of emotional stability which seems to be consistent with Wang et al.'s findings indicating that senior managers with high positive self-image and lack of emotional stability seem to have a positive attitude toward MIS implementation. In one instance an interviewee did not show a very positive attitude toward MIS implementation and the same person also stated that they were only partially in control of life indicating that they did not have the ability to positively influence their environment. There seems to be a correlation between this interviewee's low locus of control and their attitude toward MIS implementation. This finding reflects those of Hiller and Hambrick (2005) who found

that CEOs who believe that they are able to influence their environment are more likely to engage in strategic actions because of their increased levels of confidence and ambition. Locus of control is one of the elements of positive self-image which was employed to measure senior managers' personality traits in Study 1. The findings in the qualitative research regarding the direct impact of locus of control on senior managers' attitude suggest that further investigations are required on the impact of locus of control controlling for positive self-image.

Knowing that senior managers' PSI impacts their attitude and therefore how they make decisions can help reveal how a candidate for a senior manager role might make a decision in the situation where there is going to be MIS implementation. This could help develop the recruitment criteria of organisations when employing senior managers. It is established that senior managers make their decisions based on their experience, beliefs and personality traits. Then it is found that there is a relationship between their personality traits and their attitude which mediates the relationship between their personality traits and their decision to support MIS implementation. This gives a better understanding of their decision-making process which was the main aim of this study.

An interesting finding that emerged from the interviews was the revelation of some of the elements of the Big Five when interviewees discussed their perception of themselves as a manager and their colleagues perception of them was as a manager. The majority of interviewees expressed high levels of Openness to experience and Extraversion. Some of the interviewees expressed high level of Contentiousness and Agreeableness. It is likely that there is a connection between these elements of the Big Five and senior managers' attitude toward MIS implementation. Therefore, Study 3 was carried out to investigate the impact of the Big Five on senior managers' attitude toward MIS implementation in the presence of positive self-

image. This will give a better understanding of the impact of personality traits on attitude since the Big Five examines elements of personality traits that positive self-image alone may not reveal.

Career variety was found to have a significant positive impact on senior managers' attitude in Study 1. Findings of Study 2 confirmed the findings of Study 1. One of the interviewees expressed that working in different positions within an organisation had helped them to identify the issues with MIS both from a perspective of someone who requires to implement a new MIS or someone who is aware of the changes needed to make the current MIS more efficient. Another interviewee commented that working at different levels of their organisation had helped them to understand the difference that MIS could make in terms of efficiency. These findings suggest that a senior manager who has worked at different levels of an organisation could have a better understanding of the benefits of MIS. These results are in line with Díaz-Fernández, González-Rodríguez and Simonetti (2020) whose findings indicate that career variety has a great impact on the attitude of a manager in terms of the manager acquiring the skills that are essential in resolving problems faced by a firm. These managers possess the diversity of experiences so that they are aware of the importance of information technology systems for the progress of their organisations. Most interviewees in Study 2 expressed that having career variety has helped them to understand the benefits of MIS. This is consistent with the observation of Wang et al.'s (2016) that CEO's having had more prior career experience would be better prepared to take more firm strategic actions because it equips them with more knowledge and confidence. A person who has had a variety of careers is equipped with skill sets that may impact their confidence (Hiller and Hambrick, 2005), therefore, a senior manager with more career variety and knowledge of MIS are more likely to see themselves as more capable of taking risks such as implementing MIS in their organisation. This finding is aligned with the UET suggestion that CEO's prior career experience has an impact on the information they seek and notice and how they interpret and use the information to make decisions (Hambrick and Mason, 1984). This finding also suggests that senior managers' career variety could have a positive impact on their attitude toward MIS implementation which is in agreement with other research that found senior managers' prior career experience to have a positive impact on future firm performance (Wang et al, 2016), firm strategic actions (Hambrick, 2007; Wang *et al.*, 2016), firm's financial restatements (Besar et al., 2017), firm growth (Hambrick and Mason, 1984), and firms' innovation effort (Loukil et al., 2010).

The findings of Study 2 further explain the findings in Study 1 that having at least a college degree has a significant positive impact on senior managers' attitude toward MIS implementation. The interviewees expressed that their academic background helped them with the decision making process to implement MIS by equipping them with the necessary skill sets to assess risks and benefits of MIS and make the definitive

decision. This finding is in line with Barone and van de Werfhorst's (2011) finding that higher level of education has a positive impact on cognitive and non-cognitive skills of an individual including critical reasoning, decision-making, question asking, and problem solving (Zoller, 2012). These findings are in line with the findings of previous studies that found educational background is positively related to firm strategic actions (Hambrick, 2007; Wang *et al.*, 2016).

The findings of Study 2 also indicate that the academic discipline studied by a senior manager may help them to understand the importance of MIS. The majority of interviewees commented that they believed their academic discipline especially a technology discipline (e.g., engineering or science) has helped them to better understand the benefits of MIS. This finding is in line with Ahn, Minshall and Mortara (2017) who showed that CEO's education in a technology discipline has a significant positive impact on technology oriented Open Innovation (OI) adoption which is likely because it helps a CEO to more easily identify relevant technology related opportunity and knowledge. Barker and Mueller (2002) also found a significant positive association between a CEO's engineering/science degree and R&D spending. These results suggest that researchers need to consider both level of education and academic discipline when investigating the impact of senior managers' demographic characteristics on their attitude toward MIS implementation.

One of the interviewees commented that their academic background in economics, business and management taught him that MIS is important for organisations, while another one stated that their MBA was 'superfluous' and they did not think it had helped them to understand the importance of MIS. Barker and Mueller (2002) did not find any significant association between a CEO's business degree and R&D spending. Regarding academic background in business and management, their impact on senior manager' attitude are inconclusive and further research is required.

Semi-structured interviews were conducted with 12 board level senior managers from UK manufacturing organisations. The majority of interviewees alluded to elements of the Big Five when they talked about how they perceive themselves as a manager and how their colleagues perceive them as a manager. This raised the question of the Big Five being used as a measure to assess senior managers' personality traits.

Chapter 5: Study 3 (Quantitative Study)

Introduction

The question of the importance of the Big Five was raised from the findings of the qualitative study and prompted the further investigation of the impact of the Big Five on senior managers' attitude toward MIS implementation. This study addresses the third and fourth research questions. The third research question is if the relationship between positive self-image and senior managers' attitude toward MIS implementation could be explained by any personality traits in the Big Five. The fourth research question that this study is addressed is if any personality traits in Big Five could directly affect senior managers' attitude toward MIS implementation. To address the third research question, two hypotheses (H9 & H10) were generated. H9 proposes that Positive self-image accounts for variance in senior managers' attitude toward MIS implementation independently of the Big Five. H10 examines if positive self-image mediates the relationship between the Big Five and senior managers' attitude toward MIS implementation. The objective of RQ4 is to investigate if any personality traits in Big Five directly could affect senior managers' attitude toward MIS implementation. H11-H15 were generated to investigate the impact of the elements of the Big Five (i.e., Neuroticism, Extraversion, Openness to experience, Agreeableness, and Conscientiousness) on senior managers' attitude toward MIS implementation. In this chapter, the research method that was used to test the hypotheses is discussed and explained. The design of the survey and the constructs which were measured using a 5-point Likert to generate the data are provided. An explanation of the data collection procedure using a questionnaire is also given. Analysis of the data and the subsequent findings are presented.

Methods

Participants demographics

Participants were 96 board level senior managers of the UK manufacturing organisations. 58.3% of participants were from companies with more than 50 employees and turnover over £100M. 93.8% of participants were males and 6.3% were females. Participants' age ranged from 18 to 65+ years, with 36.5% between 35-44 years old. 79.2% of participants had a university degree. 75% of participants had tenure more than 3 years (see Table 39).

Table 39: Participants demographics' gender, age, highest level of education, and tenure (N=96)

Demographic categories	Frequency	Percentage (%)
Gender		
Male	90	93.8
Female	6	6.3
Age		
18-24	2	2.1
25-34	28	29.2
35-44	35	36.5
45-54	8	8.3
65+	1	1
Education		
No degree	10	10.4
College	10	10.4
University	76	79.2
Tenure		
<1 year	12	12.5
1-3 years	12	12.5
>3 years	72	75

Measures

The same questionnaire in the first study was used with some changes. To capture participants' age and tenure, instead of asking the participants to type in the actual number, they were asked to tick the relevant box. This change was made to reduce the time taken to complete the form and make it easier for the senior managers.

Senior managers' attitude toward MIS implementation

Four items were used to measure the senior manager's attitude. The participants were asked to evaluate four statements on a five-point Likert scale ranging from 'strongly disagree' to 'strongly agree'.

Senior managers' support toward MIS implementation

Level of support was measured using five items. The senior managers evaluated five statements on a five-point Likert scale ranging from 'strongly disagree' to 'strongly agree'.

Positive self-image

A 12-item measure that optimally taps the central Core Self-Evaluation (CSE) constructs developed by Judge *et al.* (2003) was used to measure senior managers' positive self-image. Items involving statements about participants' thoughts and feelings were answered on a five-point Likert scale, ranging from 'strongly disagree' to 'strongly agree'.

The Big Five

The 44-item inventory developed by John, Donahue and Kentle (1991) was used to assess the Big Five personality factors of Neuroticism, Extraversion, Openness to Experience, Agreeableness and Conscientiousness. Items consisted of statements about characteristics reactions or behaviours which are answered on a five-point Likert scale, ranging from 'strongly disagree' to 'strongly agree'.

Reliability

Cronbach's alpha was used to assess the reliability of the measures. 0.931 for support, 0.775 for Extraversion, 0.752 for Conscientiousness, 0.802 for Emotional stability, 0.739 for Agreeableness, 0.759 for Openness. Positive self-image consists of two sub dimensions (negative and positive). 0.821 for CSE-N and 0.812 for CSE-P and 0.788 for overall. Cronbach's alpha of attitude was 0.646. Attitude consists of two sub dimension (implementation and benefits), therefore, Cronbach's alpha of each sub dimension was tested with 0.705 and 0.946, found respectively. Although attitude is made up of two sub dimension the researcher decided to work with attitude as an overall construct given the fact that the sub dimensions are quite interlinked. A minimum level of 0.7 recommended by Nunnally (1978) was found for all the items.

Data collection procedure

In order to answer the third research question 'Could the relationship between positive self-image and senior managers' attitude toward MIS implementation be explained by any personality traits in the Big Five?', a survey was conducted. In this study, simple random sampling was used to ensure random and equal representation across the population. 250 invitation emails were sent to board level senior managers, whose contact details were collected at two conferences that the researcher attended, to participate in the survey. 96 senior managers agreed to take part and completed the questionnaire (response rate 38.4%). The average response rate for studies involving senior management is 36.1% (Baruch, 1999). The survey was hosted on OnlineSurveys. The researcher attended two conferences to recruit participants. The first conference- 'Digitalising Manufacturing Conference' - was held on 8-12th November 2021 in Liverpool which is industry's largest digital manufacturing exhibition in the UK hosting 3,000 manufacturers (The Manufacturer, 2021a). This was chosen specifically as it is the largest exhibition in the UK and where the manufacturers attending are already interested in digitalisation. The second conference was held in Glasgow on 13th October 2022 and called 'Scotland Manufacturing and Supply Chain Conference and Exhibition'. This conference was chosen as it focused on digitalisation for manufacturers, therefore, participants were going to have an interest in digitalisation.

Before data collection, a human research ethic approval was obtained. This research was approved on 21 April 2022 (Reference: 36559-LR-Mar/2022- 38901-1) by the Research Ethics Committee of Brunel University for the period 21/04/2022 and 31/08/2022. An extension was requested as researcher did not recruit enough participants and approved on 20th September 2022 (Reference: 36559-A-Sep/2022- 41572-1) for 20/09/2022 and 15/11/2022. For maintaining the validity and the authenticity of this research, the researcher ensured the willing consent of the participants by providing a consent form which highlighted the details of the research including the purpose, scope and the aim for maintaining the level of transparency.

Data analysis

Results

Data screening and cleaning

Missing data

Little MCAR (missing completely at random) test was conducted to check that the values were missing randomly which causes less serious problems (Tabachnick and Fidell, 2019). PSI3, PSI12, EXT1, EXT4, EXT8,

AGR4, AGR9, CONS3, CONS4, CONS8, EMS3, EMS4, OPEN3, company age, and turnover had only one missing value each. Company size and IS projects had three and two missing values, respectively. Attitude, support, number of distinct organisations, number of years before becoming senior manager, number of distinct industries, age, gender and education did not have any missing values. The results from Little MCAR test showed that all the missing values were randomly distributed (all p-values >0.05). According to Tabachnick and Fidell (2019), if less than 5% of data is missing randomly from a large data set, almost any procedure to handle missing values will still yield similar results. In this study, there are only 19 missing values (see Appendix F: Little MCAR Test). In terms of handling missing data, multiple imputation seems to be the most recommended method. However, Expectation Maximization (EM) appears to be also appropriate when dealing with small amounts of missing data which is missing randomly. Therefore, EM was used as the method to replace missing values.

Univariate outliers and normality

Assessing normality

Kolmogorov-Smirnov and Shaapiro-Wilk tests of normality were conducted to assess the normality of the data. Table 40 shows that senior managers' involvement in IS projects, attitude and support toward MIS implementation, Openness to experience, career variety, and positive aspect of positive self-image are not normally distributed ($p < 0.05$). While senior managers' positive self-image, extraversion, Agreeableness, Conscientiousness, emotional stability, and negative aspect of positive self-image are normally distributed ($p > 0.05$). It is unlikely for career variety to have a normal distribution because it demonstrates different positions and job functions that an individual has during his career life. Involvement of senior managers in IS projects is not normally distributed as expected. Although the results of K-S did not support normal distribution of attitude, and support, under visual inspection, it can be assumed that they are normally distributed.

Table 40: Kolmogorov-Smirnov and Shaapiro-Wilk tests of normality; ISprojects: number of IS projects senior managers involved in; PSI_Mean: mean of senior managers' positive self-image; attitude_mean: mean of senior managers' attitude toward MIS implementation; Support_mean: mean of senior managers' support toward MIS implementation; EXT_mean: mean of Extraversion; AGR_mean: mean of Agreeableness; CONS_mean: mean of Conscientiousness ; EMS_mean: mean of Emotional stability; OPEN_mean: mean of Openness to experience; career_variety: senior managers' career variety; CSE_P: positive aspect of PSI; CES_N: negative aspects of PSI (N=96).

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
ISprojects	.387	96	.000	.365	96	.000
PSI_mean	.076	96	.200*	.980	96	.156
attitude_mean	.125	96	.001	.944	96	.000
Support_mean	.183	96	.000	.885	96	.000
EXT_mean	.078	96	.181	.987	96	.486
AGR_mean	.079	96	.166	.981	96	.174
CONS_mean	.093	96	.040	.980	96	.141
EMS_mean	.084	96	.095	.975	96	.059
OPEN_mean	.081	96	.136	.970	96	.027
Career_variety	.258	96	.000	.644	96	.000
CSE_P	.149	96	.000	.850	96	.000
CSE_N	.089	96	.058	.981	96	.177

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Validity tests

The researcher only conducted the initial validity of attitude and support measures since they were designed by the researcher. Proving the validity of the measures was beyond the scope of the current research project. Factor analysis with PCA was used as a method of extracting factors to test the initial validity of measures. Validity of the pre-established measures including positive self-image and the Big Five was confirmed by the literature e.g., Judge et al. (2003) and Judge and Zapata (2015), respectively. Bartlett's (1954) test of Sphericity

and KaiserMeyer-Olkin (KMO) value of 0.6 recommended by Kaiser (1970, 1974) were used to determine the suitability of data to be factorised.

Senior managers’ support toward MIS implementation

Table 41 shows sample loading and test results of KMO and Bartlett’s test confirming that sample size was big enough to use this method. All the items were loaded on the respective factor.

Table 41: Factor loadings for senior managers’ support toward MIS implementation (N=96); S1: senior managers’ readiness to support MIS; S2: senior managers’ use of change management strategies; S3: senior managers opinion regarding MIS implementation; S4:likelihood that senior managers support MIS implementation; S5: senior managers’ readiness to involve in MIS implementation.

Measure	Factor loading
S1	0.913
S2	0.907
S3	0.851
S4	0.916
S5	0.840

KMO 0.842

Bartlett’s< 0.001

Variance explained 78.512%

Senior managers’ attitude toward MIS implementation

KMO measure of sampling adequacy was 0.509 and Bartlett’s was less than 0.001 confirming that the sample was big enough to use this method. Oblimin with Kaiser Normalisation was used as a rotation method since the sub-dimensions are inter-correlated. PCA confirmed that attitude consists of two sub-dimensions. Factor 1 was comprised of two items reported on a 5-point Likert scale that explained 50.90% of the variance with factor loadings of 0.973 and .970. Factor 2 was comprised of two items reported on a 5-point Likert scale that explained 36.059 % of the variance with factor loadings of 0.887 and 0.870.

Descriptive statistics

Table 42 shows the descriptive statistics of variables.

Table 42: Minimum, maximum, mean, and standard deviation of variables; *PSI_Mean*: mean of senior managers' positive self-image; *attitude_mean*: mean of senior managers' attitude toward MIS implementation; *Support_mean*: mean of senior managers' support toward MIS implementation; *EXT_mean*: mean of Extraversion; *AGR_mean*: mean of Agreeableness; *CONS_mean*: mean of Conscientiousness ; *EMS_mean*: mean of Emotional stability; *OPEN_mean*: mean of Openness to experience; *career variety*: senior managers' career variety; *CSE_P*: positive aspect of PSI; *CES_N*: negative aspects of PSI (N=96).

Variable	Min	Max	Mean	Standard deviation
PSI_mean	2.67	5.00	3.70	0.54
CSE_P	1.00	5.00	3.93	0.62
CSE_N	1.50	5.00	3.47	0.81
EXT_mean	2.38	5.00	3.69	0.59
AGR_mean	2.33	4.89	3.78	0.54
CONS_mean	2.33	4.89	3.75	0.54
EMS_mean	1.60	4.90	2.47	0.64
OPEN_mean	1.60	4.90	3.71	0.52
Attitude_mean	1.00	5.00	3.79	0.71
Support_mean	1.00	5.00	3.78	0.78

Inferential statistics

To answer the third research question, the first model tested whether the relationship between the Big Five and senior managers' attitude toward MIS implementation is mediated by positive self-image.

Regression analysis

Verifying assumptions

Before running regression analysis, five assumptions needed to be checked including, linear relationship between independent variables and dependent variables, absence of outliers, absence of multicollinearity, homoscedasticity, and normal distribution of residuals (Field, 2010). All these assumptions were checked and the criteria were met (see Appendix K for details).

Simple linear regression

Simple linear regression results for the big five and positive self-image are shown in Table 43. Simple linear regression was used to test if CSE_P, CSE_N, PSI, extraversion, agreeableness, conscientiousness, emotional stability and openness to experience significantly predicted senior managers' attitude toward MIS implementation. It was found that all the variables expect openness to experience ($\beta=0.138$, $p=0.087$) significantly predicted attitude. Simple linear regression was also used to test if senior managers' attitude toward MIS implementation significantly predicted senior managers' support toward MIS implementation. It was found that attitude significantly predicted support ($\beta=0.573$, $p<0.001$) (see Table 43). The strongest personality effect was agreeableness followed by conscientiousness, with slightly weaker effects for emotional stability, followed by extraversion and positive self-image.

Table 43: simple linear regression; PSI; positive self-image; CSE_P: positive aspect of PSI; CES_N: negative aspects of PSI; EXT: Extraversion; AGR: Agreeableness; CONS; Conscientiousness; EMS: Emotional Stability/ Neuroticism; OPEN: Openness to experience; attitude; senior managers' attitude toward MIS implementation; support: senior managers' decision to support MIS implementation.

Variable	Unstandardized coefficients β	Standardized coefficients Beta (β)	t	p	Adjusted R square
CSE_P→attitude	0.240	0.209	2.073	0.041	0.034
CSE_N→attitude	0.193	0.219	2.178	0.032	0.038
PSI→attitude	0.366	0.281	2.840	0.006	0.069
The Big Five					
EXT→attitude	0.384	0.321	3.286	0.001	0.093
AGR→attitude	0.587	0.446	4.830	0.000	0.190
CONS→attitude	0.530	0.402	4.261	0.000	0.153
EMS→attitude	-0.396	-0.359	-3.724	0.000	0.119
OPEN →attitude	0.238	0.138	1.731	0.087	0.021
Attitude→support	0.627	0.573	6.777	0.000	0.321

Hypotheses analysis

This section examines **H11-H-15** to address Research Question 4, which concerns the impact of Neuroticism, Extraversion, Openness to experience, Agreeableness, and Conscientiousness on senior managers' attitude toward MIS implementation. **H11** proposes that neuroticism (emotional stability) has a negative impact on senior managers' attitude toward MIS implementation. Neuroticism had a significant negative impact on attitude ($\beta=-0.359$, $P<0.001$). Therefore, **H11** was supported. **H12** proposes that Extraversion has a positive impact on senior managers' attitude toward MIS implementation. Extraversion had a significant positive impact on attitude ($\beta=0.321$, $P<0.001$). Therefore, **H12** was supported. **H13** proposes that Openness to experience has a positive impact on senior managers' attitude toward MIS implementation. Openness to experience did not have a positive significant effect on attitude ($\beta=0.138$, $P=0.087>0.05$). Thus, **H13** was not supported. Although we expected a positive relationship between the variables for **H14**, the result was in the opposite direction than hypothesized and significant ($\beta=0.446$, $P<0.001$). **H15** was also in the opposite direction than hypothesized ($\beta=0.402$, $P<0.001$). **Hypothesis 9:** Positive self-image accounts for variance in senior managers' attitude toward MIS implementation independently of the Big Five. **Hypothesis 10:** Positive self-image mediates the relationship between the Big Five and senior managers' attitude toward MIS implementation.

To test H9, multiple hierarchical regression was done (see Table 44) to assess if PSI is a statistically significant predictor of attitude even after controlling for the Big Five dimensions. Although PSI stopped being statistically significant after controlling for the Big Five dimensions except for Openness to experience which was found not to be a significant predictor of attitude in the simple linear regression, PSI was still statically significant predictor of attitude In the simple linear regression, therefore, H9 was not supported.

Table 44: Hierarchical regression; PSI; positive self-image; EXT: Extraversion; AGR: Agreeableness; CONS; Conscientiousness ; EMS: Emotional stability/ Neuroticism; OPEN: Openness to experience; attitude: senior managers' attitude toward MIS implementation (N=96).

Variable		Unstandardized coefficients β	Standardized coefficients Beta (β)	t	P
Model	1:	0.366	0.281	2.840	0.006
PSI→attitude					
Model	2:	0.220	0.169	1.546	0.126
PSI→attitude					
EXT→attitude		0.291	0.243	2.223	0.029
Model	1:	0.366	0.281	2.840	0.006
PSI→attitude					
Model	2:	0.155	0.119	1.179	0.241
PSI→attitude					
AGR→attitude		0.523	0.397	3.937	0.000
Model	1:	0.366	0.281	2.840	0.006
PSI→attitude					
Model	2:	0.118	0.091	0.888	0.421
PSI→attitude					
CONS→attitude		0.466	0.353	3.148	0.002
Model	1:	0.366	0.281	2.840	0.006
PSI→attitude					
Model	2:	0.060	0.046	0.331	0.741
PSI→attitude					
EMS→attitude		-0.359	-0.325	-2.325	0.022
Model	1:	0.366	0.281	2.840	0.006
PSI→attitude					
Model	2:	0.328	0.252	2.438	0.017
PSI→attitude					
OPEN →attitude		0.142	0.105	1.017	0.312

To test H10, mediation analysis was conducted (see Table 45). A mediator is a variable which when it is entered into a regression model, explains or accounts for the relationship between a predictor and an outcome variable. If the original relationship disappears, it is a complete mediation, while in the case that the original relationship is attenuated, it is a partial mediation. On the other hand, a moderator is a variable that interacts with a predictor to change the relationship between the predictor and the outcome variable. It can increase, decrease or change the direction. A moderator specifies the conditions under which the predictor has a relationship with the outcome. Mediation was chosen over moderation because the focus of this study is to find out if PSI affects the relationship between the Big Five and attitude rather than testing if PSI interacts with the Big Five dimensions to change the relationship between the Big Five dimensions and attitude. According to Baron and Kenny (1986), there must be a significant correlation between all the variables involved. Correlation analysis showed that all the variables involved are significantly correlated except for Openness to experience (see Appendix M). Therefore, no further mediation analysis was conducted for Openness to experience. All the predictors (elements of the Big Five including emotional stability, Extraversion, Agreeableness, and Conscientiousness) must significantly predict the mediator (positive self-image). The mediator (positive self-image) must significantly predict the outcome variable (senior managers' attitude toward MIS implementation). The predictor variable must predict the outcome variable less strongly when the mediator is taken into account.

The mediating effect of positive self-image on the relationship between the elements of the Big Five and senior managers' attitude toward MIS implementation was tested using the Baron and Kenny (1986) approach, involving three successive linear (two simple, one multiple) regression analyses. For each regression, additional analysis was conducted to ensure that assumptions of linearity, multicollinearity, outliers, normality of residuals and homoscedasticity were not violated (see Appendix K for details).

Working at the 5% level of significance, from the first analysis it was established that the total effect of emotional stability on attitude was significant, $B = -0.359$, $p < 0.001$, with $F(1,94) = 13.872$, $p < 0.001$. The second regression suggested that emotional stability has a significant impact on positive self-image, $B = -0.612$, $p < 0.001$, with $F(1, 94) = 102.397$, $p < 0.001$. The third regression was a linear multiple regression analyses with emotional stability and positive self-image as causal variables and the attitude as the outcome variable. This showed that the relationship between positive self-image and attitude now was NOT significant, $B = 0.046$, $p = 0.741$, whereas the relationship between emotional stability and attitude was significant, $B = -0.325$, $p = 0.022$, with $F(2,93)=6.925$, $p=0.002$. Hence it could be concluded that emotional stability has a full mediation effect on the relationship between positive self-image and attitude.

Working at the 5% level of significance, from the first analysis it was established that the total effect of Extraversion on attitude was significant, $B = 0.321$, $p = 0.001$, with $F(1,94) = 10.795$, $p = 0.001$. The second regression suggested that emotional stability has a significant impact on positive self-image, $B = 0.461$, $p < 0.001$, with $F(1, 94) = 25.436$, $p < 0.001$. The third regression was a linear multiple regression analyses with Extraversion and positive self-image as causal variables and the attitude as the outcome variable. This showed that the relationship between positive self-image and attitude now was NOT significant, $B = 0.169$, $p = 0.126$ whereas the relationship between Extraversion and attitude was significant, $B = 0.131$, $p = 0.029$, with $F(2,93)=6.672$, $p=0.002$. Hence it could be concluded that Extraversion has a full mediation effect on the relationship between positive self-image and attitude.

Working at the 5% level of significance, from the first analysis it was established that the total effect of Agreeableness on attitude was significant, $B = 0.446$, $p < 0.001$, with $F(1,94) = 23.326$, $p < 0.001$. The second regression suggested that Agreeableness has a significant impact on positive self-image, $B = 0.408$, $p < 0.001$, with $F(1, 94) = 18.776$, $p < 0.001$. The third regression was a linear multiple regression analyses with Agreeableness and positive self-image as causal variables and the attitude as the outcome variable. This showed that the relationship between positive self-image and attitude now was NOT significant, $B = 0.119$, $p = 0.241$ whereas the relationship between Extraversion and attitude was significant, $B = 0.397$, $p < 0.001$, with $F(2,93)=12.406$, $p < 0.001$. Hence it could be concluded that Agreeableness has a full mediation effect on the relationship between positive self-image and attitude.

Working at the 5% level of significance, from the first analysis it was established that the total effect of conscientiousness on attitude was significant, $B = 0.402$, $p < 0.001$, with $F(1,94) = 18.153$, $p < 0.001$. The second regression suggested that conscientiousness has a significant impact on positive self-image, $B = 0.539$, $p < 0.001$, with $F(1, 94) = 38.415$, $p < 0.001$. The third regression was a linear multiple regression analyses with conscientiousness and positive self-image as causal variables and the attitude as the outcome variable. This showed that the relationship between positive self-image and attitude now was NOT significant, $B = 0.091$, $p = 0.421$ whereas the relationship between conscientiousness and attitude was significant, $B = 0.353$, $p = 0.002$, with $F(2,93)=9.369$, $p < 0.001$. Hence it could be concluded that conscientiousness has a full mediation effect on the relationship between positive self-image and attitude.

Table 45: Mediation analysis; PSI; positive self-image; EXT: Extraversion; AGR: Agreeableness; CONS; Conscientiousness; EMS: Emotional stability/ Neuroticism; Attitude: senior managers' attitude toward MIS implementation (N=96).

Variable	Unstandardized coefficients β	Standardized coefficients Beta (β)	t	p	Adjusted R square
EMS→PSI	-0.612	-0.722	-10.119	0.000	0.516
EMS→PSI→attitude	0.060	0.046	0.331	0.741	0.111
EXT→PSI	0.424	0.461	5.043	0.000	0.205
EXT→PSI→attitude	0.220	0.169	1.546	0.126	0.107
AGR→PSI	0.412	0.408	4.333	0.000	0.158
AGR→PSI→attitude	0.155	0.119	1.179	0.241	0.194
CONS→PSI	0.544	0.539	6.198	0.000	0.283
CONS→PSI→attitude	0.118	0.091	0.808	0.421	0.283

Concluding discussion

Study 3 was carried out to answer RQ3 'Could the relationship between positive self-image and senior managers' attitude toward MIS implementation be explained by any personality traits in the Big Five?' and RQ4 'Could any personality traits in the Big Five directly affect senior managers' attitude toward MIS implementation?'. A survey questionnaire was conducted to answer these research questions. This study provides evidence that four of the Big Five personality dimensions (i.e., Agreeableness, Conscientiousness, Extraversion, and Emotional stability) have a significant impact on senior managers' attitude toward MIS implementation. Agreeableness and Conscientiousness appear to be the personality constructs that most strongly and consistently have an effect on senior managers' attitude toward implementation. Only Openness to experience appears not to have a significant impact on attitude. The results are consistent with the view that personality traits play a role in senior managers' attitude found in previous studies e.g., (Marcati, Guido and Peluso, 2008; Wang *et al.*, 2016).

The results for Agreeableness are particularly interesting because they shed light on inconsistent findings in the literature (e.g., Zhao, Seibert and Lumpkin (2010); Antoncic *et al.* (2018); Hurtz and Donovan, (2000); Barrick and Mount, (1991).). Antoncic *et al.* (2018) conclude that Agreeableness is negatively related to company performance in terms of growth and profitability, whereas other studies (e.g., Zhao, Seibert and Lumpkin (2010); Hurtz and Donovan, (2000); Barrick and Mount, 1991) provide evidence that Agreeableness is unrelated to entrepreneurial performance. The inconsistent findings in the literature

could possibly be explained by the fact that the meta-analysis study undertaken by Zhao, Seibert and Lumpkin (2010) combined studies of entrepreneurial status and entrepreneurial performance together which will lower the overall effect size, possibly to the point that no significant impact can be detected. While Antoncic *et al.*'s (2018) study empirically investigated the relationship between the Big Five attributes of managers from Slovenian SMEs and their company's business performance. In this study Agreeableness was found to have a strong positive association with attitude which is in line of the findings of (Devaraj, Easley and Michael Crant (2008) who showed Agreeableness to have a significant positive impact on technology adoption. They investigated the impact of the Big Five on technology acceptance and use in 180 MBA students. They argued that when a certain technology fosters cooperation and collaboration, individuals high in Agreeableness are more likely to be accepting of the technology and concentrate more on the cooperative and positive aspects of the technology. MIS puts all the information from a company into one entity ,helping all employees to have access to accurate information at the same time, therefore, MIS can be considered as a technology that fosters collaboration and cooperation. Therefore, it is likely that a senior manager who scores high in Agreeableness will concentrate more on these aspects of MIS and have a more positive attitude toward MIS implementation. The qualitative findings of this study also confirms that a majority of interviewees who had a high level of Agreeableness had a positive attitude toward MIS implementation which further confirms the results of Study 3.

Results from this study indicate that senior managers' high in Conscientiousness are more likely to have a positive attitude toward MIS implementation. Linear regression estimates for the effect size of Conscientiousness was 0.15 for attitude toward MIS implementation which is comparable to other studies investigating the impact of C on entrepreneurial firm performance. For example, Hurtz and Donovan (2000) and Zhao, Seibert and Lumpkin (2010) found Conscientiousness to be one of the strongest predictors (.19) for entrepreneurial firm performance. This implies that more conscientious people would have a more positive attitude toward MIS implementation. The findings are interesting because it was assumed that because of the high uncertainty that MIS implementation involves, more conscientious senior managers would be more likely to have a less positive attitude toward MIS implementation. Although MIS implementation is challenging, it has high potential for profit (Chatti, Radouche and Asfoura, 2021) which might provide context for highly achievement-motivated senior managers to have a more positive attitude toward MIS implementation. Senior managers who scored higher in C are found to be more motivated for achievement and it is therefore likely that the benefits of MIS are more appealing to them than fear of failure. This finding is consistent with the view that entrepreneurs are more motivated to achieve their goals found in previous meta-analyses (e.g., Zhao, Seibert and Lumpkin (2010); Zhao and Seibert (2006)). Findings from the qualitative research also suggest that there is positive correlation between senior managers' Conscientiousness and attitude.

The literature reported inconsistent findings regarding Extraversion. Some studies found that Extraversion did not significantly impact long-term venture survival (Ciavarella *et al.*, 2004) and entrepreneurial status (Zhao and Seibert, 2006) which is likely because of moderators and their impact on the relationship which was not identified and tested due to lack of relevant information in primary studies. While other studies found a positive significant association between Extraversion and entrepreneurial firm performance (Zhao, Seibert and Lumpkin (2010); Antoncic *et al.* (2018)). While the validity of Extraversion in predicting attitude appears to be distinguishable from zero, the overall relationship is smaller than Conscientiousness, Agreeableness, and Emotional stability.

From this study, it was shown that Neuroticism had a significant negative impact on attitude. Meta-analytical findings from other studies show that emotional stability (opposite of Neuroticism) is positively related to job performance across occupations (Barrick, Mount and Judge, 2001); leadership emergence and effectiveness (Judge, Erez, *et al.*, 2002); and business growth and profitability (Zhao, Seibert and Lumpkin, 2010). Decisions to implement MIS in the UK manufacturing organisations are likely to be even more challenging and stressful than in larger manufacturers due to UK manufacturers being mainly SMEs

with limited access to financial resources and MIS implementation involving high levels of uncertainty and risk of failure (Ali and Miller, 2017). High levels of anxiety and negative moods such as depression, hostility and anger are likely to interfere with an individuals' ability to make sound decisions. Senior managers in the UK manufacturing organisations with high levels of emotional stability are more likely to be more risk tolerant (Wong and Carducci, 2013; Oehler *et al.*, 2018) and therefore more likely to have a positive attitude toward MIS implementation.

Contrary to expectations, in this study Openness to experience did not have a significant impact on senior managers' attitude toward MIS implementation. There are inconsistent findings in the literature regarding Openness. Antoncic *et al.* (2018) and Zhao, Seibert and Lumpkin (2010) reported that entrepreneurs' Openness has a strong significant impact on entrepreneurial performance and firm growth, while other studies (e.g., (Hurtz and Donovan, 2000; Barrick, Mount and Judge, 2001) found that Openness is a weak and nonsignificant predictor of manager's job performance. In response to Barrick, Mount and Judge(2001) and Hurtz and Donovan's (2000) findings, Zhao, Seibert and Lumpkin (2010) pointed out that Openness is the major personality construct that differentiates high performance in an entrepreneurial and managerial role. A study by Ciavarella *et al.* (2004) found that entrepreneur's Openness has a negative significant impact on long-term venture survival. They explained this by saying that an entrepreneur scoring high in Openness would be open to too many opportunities instead of concentrating on one opportunity which could significantly reduce the chance of success of an individual project. It may be beneficial to carry out research for moderators of the relationship between Openness and attitude.

Similar to the findings of Judge *et al.* (2003) where both Conscientiousness (average $r = .51$) and Extraversion (average $r = .50$) were moderately to strongly correlated with positive self-image across their four samples, this study found that positive self-image is significantly correlated with Extraversion ($r = 0.46$, $p < 0.01$), Emotional stability ($r = -.72$, $p < 0.01$), and Conscientiousness ($r = 0.54$, $p < 0.01$), that is to say extraverted, emotionally stable and conscientious people have a generally more positive self-belief. The findings of this study showed that Openness to experience is not significantly correlated to positive self-image which is consistent with the findings of Judge *et al.* (2003). However, contrary to Judge *et al.*'s (2003) study that did not find a significant association between Agreeableness and positive self-image, this study found a significant correlation between Agreeableness and positive self-image ($r = 0.41$, $p < 0.01$). This may be because Judge *et al.*'s sample consisted of managers of two companies and students at two different universities whereas the sample of this study consisted only of board level senior managers in UK manufacturers.

In terms of effect size, Hurtz and Donovan (2000) found Conscientiousness to be the strongest predictor of managers' job performance (.19), followed by Emotional stability (.13) and Extraversion (.13). The current results show comparable effect sizes for these three constructs (Conscientiousness (.15); Emotional stability (.12); Extraversion (.09)). Agreeableness (.19) was the strongest effect in current analysis for senior managers' attitude toward MIS implementation which is consistent with Hurtz and Dinovan's (2000) findings that Agreeableness had a stable significant impact on the interpersonal facilitation criteria.

The third question this research sought to answer was the relationship between positive self-image and senior managers' attitude toward MIS implementation could be explained by any personality traits in the Big Five. This study did not detect any evidence that positive self-image accounts for variance in senior managers' attitude toward MIS implementation independently of the Big Five. Although previous studies (e.g., Asendorpf and Van Aken (2003)) suggested that positive self-image could be the mediator between the Big Five elements and attitude, positive self-image in this study was not found to be the mediator of the relationship between the Big five elements and senior managers' attitude toward MIS implementation. It seems that the Big Five elements (including Extraversion, Agreeableness, Emotional stability and Conscientiousness) might be the mediator between the relationship of positive self-image and attitude. Previous findings in published studies investigating the impact of positive self-image and the Big Five on test anxiety (Chamorro-Premuzic, Ahmetoglu and Furnham, 2008); entrepreneurial decisions (Caliendo, Fossen and Kritikos, 2011); leadership emergence and effectiveness (Judge, Bono, *et al.*, 2002) are not consistent. The finding of this study is consistent with that of Chamorro-Premuzic, Ahmetoglu and Furnham (2008) who found that when the Big Five, particularly N, are taken into account, the impact of positive self-image on test anxiety is substantially reduced. They suggested that the Big Five is a better predictor of test anxiety than Core Self-Evaluation. It seems possible that the results of present study are due to the overlapping nature of emotional stability in positive self-image and neuroticism in the Big Five and partial correlation between positive self-image, Extraversion, and Conscientiousness (Judge *et al.*, 2003). The findings of the present study suggest that in the presence of the Big Five, the impact of positive self-image is substantially reduced. This could be explored further in future studies. Although PSI is not as commonly used as the Big Five, given the fact that it is much shorter in length and it took a much shorter time to fill out, practitioners are still able to use it to assess personality traits of senior managers in early stages of the recruitment and selection process.

Some of the findings in this study were similar to Study 1 i.e., significant impact of PSI on senior managers' attitude toward MIS implementation. However, some of the findings were additional since the impact of the big five on attitude was also investigated.

Chapter 6: Discussion

Introduction

As mentioned in the literature review, senior managers make their strategic choices based on their experiences, beliefs, and personality traits. According to Hambrick and Mason's (1984) Upper Echelon Theory, senior managers' experiences and beliefs can be measured by their demographic characteristics (i.e., age, tenure, prior career experience, educational background, and personality traits). Although several studies have been carried out to investigate the impact of senior managers' characteristics on firm outcomes, no studies have been found to investigate the impact of senior managers' characteristics on their decision to implement MIS in UK manufacturing organisations. The findings of this study should make an important contribution to the field of the Upper Echelon Theory by extending and adding other contributory factors to senior managers' characteristics to measure their experiences and beliefs.

Findings of all three studies (Study 1, Study 2, and Study 3) revealed that senior managers' personality traits have a significant impact on their attitude toward MIS implementation. This finding supports the Upper Echelon Theory which states that senior managers' experiences, values, and personality traits greatly impact how they interpret the situations they face, which in turn, influences their choices (Hambrick, 2007). This finding may help us to understand how senior managers make their decisions to implement MIS in their organisations, especially, in the UK context where the majority of organisations are SMEs with more limited access to financial resources. MIS implementation in this situation involves higher risk than in larger organisations with more budget to invest in MIS implementation.

All three studies confirm that senior managers' positive self-image has a significant impact on their attitude toward MIS implementation. This finding is in line with previous studies which have demonstrated that positive self-image is positively related to a firm's strategic actions (Wang et al. 2016), job satisfaction (Judge et al. 2003), job performance (Judge et al. 2003), life satisfaction (Judge et al. 2003), speed of a firm's strategic decision-making (Hiller and Hambrick, 2005), centralisation of a firm's strategic decision-making (Hiller and Hambrick, 2005), motivation and performance (Erez and Judge 2001) and a firm's performance (Hiller and Hambrick, 2005). Knowing that senior managers' PSI impacts their attitude and therefore how they make decisions can help reveal how a candidate for a senior manager role might make a decision in the situation where there is going to be MIS implementation. This could help develop the recruitment criteria of organisations when employing senior managers.

Both studies 1 and 2 indicate that senior managers' career variety has a positive significant impact on their attitude toward MIS implementation. This finding is in line with Díaz-Fernández, González-Rodríguez

and Simonetti (2020) whose findings indicate that career variety has a great impact on the attitude of a manager in terms of the manager acquiring the skills that are essential in resolving problems faced by a firm. These managers possess the diversity of experiences so that they are aware of the importance of information technology systems for the progress of their organisations. One of the interesting findings of both study 1 and 2 is that having at least a college degree has a significant positive impact on senior managers' attitude toward MIS implementation. The findings indicated that senior managers' academic background helped them with the decision making process to implement MIS by equipping them with the necessary skill sets to assess risks and benefits of MIS and make the definitive decision. These findings are in line with the findings of previous studies that found educational background is positively related to firm strategic actions (Hambrick, 2007; Wang *et al.*, 2016). These findings did not emerge in Study 3 since this study was mainly focused on the positive self-image and the Big Five rather than senior managers' demographic characteristics.

Contributions

This study contributes in several ways to our understanding of factors affecting senior managers' decisions to support MIS implementation and provide a basis for further studies.

1. In relation to theoretical contributions, **Upper Echelon Theory has been extended to include senior managers' prior involvement in IS projects as an additional and necessary predictor of attitude** with highly significant impact. Although its effect size is fairly small, the finding is practically significant. For example, moving from a senior manager with a prior involvement in IS projects one standard deviation (s.d.) below the mean to a senior with a score one s.d. above the mean was associated with a decrease of 21% of one s.d. in their attitude. The literature (Palanisamy, 2001; Harris and Weistroffer, 2009; Le *et al.*, 2020) generally investigated the impact of user involvement in IS planning and successful implementation which is different to senior managers' prior involvement in IS projects examined in this study. Although some studies (Jarvenpaa and Ives, 1991; Hermano and Martín-Cruz, 2016) examined the impact of senior managers involvement in projects on project performance, no studies examined the impact of their involvement on their attitude which makes this study novel. The analysis undertaken here, has extended our knowledge of the reasons why some senior managers with extensive experience in MIS implementation are reluctant to support implementation because they have a preconceived/ biased idea of implementation projects.
2. An additional extension to UET was **career variety which was found to be a significant predictor of attitude** to measure prior career experience. Career variety defines distinct professional and institutional experiences of an employee before becoming a senior manager which provides a much broader picture of prior career experience. The career variety identified therefore assists in understanding of how senior managers' prior experience impacts their attitude toward MIS implementation. The studies (Barker and Mueller, 2002; Zarutskie, 2010; Loukil, Yousfi and Cheikh, 2020; Zhu, Hu and Shen, 2020) do not tend to use career variety, however using it is very beneficial because it not only captures prior career experience of an individual, but also demonstrates one's dispositional preference for change and experimentation and their accumulated cognitive breadth. The only study that adopted career variety as a measurement of prior career experience was conducted by Crossland *et al.* (2014), who found that career variety had a weak significant impact on resource allocation with coefficient of 0.37. This study also shows that career variety has a weak significant impact on attitude with coefficient of 0.16 with effect size of 0.04.

3. The literature (Lam, Cho and Qu, 2007; Ndofirepi, 2020; Xu *et al.*, 2020) used some of the individual elements of Core Self-Evaluation and an indirect approach to measure positive self-image which might be a cause of instability in the model when using a direct approach. The indirect approach which they used involved completion of lengthy questionnaires which limited their study in terms of the size of sample that was achieved. Another contribution of this research includes **the use of core self-evaluation (CSE) which provides a more comprehensive picture of senior managers' positive self-image**. In this study, the impact of positive self-image on senior manager's attitude was investigated by measuring CSE as a direct approach and item-parcelling rather than an indirect approach. **Using a direct approach** results in a shorter time required to fill out the questionnaire, thus the response rate of the survey increases, which produces a larger sample size. A larger sample size increases the reliability and precision of the findings. **Using item-parcelling** is beneficial as it makes the model more stable and efficient which results in more precise results. The contribution of this study has been to confirm that senior managers' positive self-image has a highly significant positive impact on their attitude toward MIS implementation. The direct approach allowed this research to have a larger sample size and item-parcelling made the model stable to achieve precise findings.
4. **The mediating role of attitude was considered in relation to senior managers' characteristics and their support toward MIS implementation in UK manufacturing organisations**, which is crucial in the understanding of senior managers' support toward MIS implementation because attitude as a mediator links characteristics of senior managers with their attitude and support when the direct impact of determinants of attitude is not significant. The study has provided a model to predict senior managers' attitude toward MIS implementation.
5. This study set out to investigate the impact of senior managers' characteristics and personality traits on their decision to implement MIS in the UK manufacturing sector. This study has identified that senior managers' personality traits have the strongest impact on their attitude and decision-making to implement MIS. Although the second survey investigating the impact of the Big Five and positive self-image on senior managers' attitude is based on a small sample of participants, the findings suggest that CSES and the Big Five can both be useful tools to measure senior managers' personality traits. CSES can be used as early stages of recruitment process since it is shorter than the Big Five. The Big Five was found to be a better predictor of senior managers' attitude toward MIS implementation.

6. The results provide insight into how senior managers' characteristics and personality traits impact their decision to implement MIS, for example, it was found that senior managers who are longer tenured, have more prior career experience, have at least college degree, score high on Agreeableness and Conscientiousness with lack of emotional stability tend to have a more positive attitude toward MIS implementation. results can help organisational decision makers when they are selecting new board level managers or choosing from existing managers to be involved in MIS implementation.
7. Additional qualitative methods like interviews helped to provide better understanding of the results from the empirical work. The results of the interviews are in line with the observed findings of the empirical studies.
8. The final contribution of this study is in **the context i.e., MIS implementation in UK manufacturing**. To date, there are no studies which have examined the predictors of senior managers' decision to support MIS implementation in relation to UK manufacturers. UK manufacturing organisations are at a relatively early stage of MIS implementation (*Annual Manufacturing Report 2019: Taking the pulse of British industry*, 2019) compared to other sectors which are perhaps more advanced in their use of digital technology. Another factor to consider in relation to the context of the study is that many of the participant organisations are SME's which may have limited access to financial resources. Successfully implemented MIS will increase the productivity of a firm by improving its links within its supply chain, which leads to higher resilience. According to The Manufacturer (2021d), the resilience of UK manufacturing is consistently behind the western European average and increasing its productivity could add £26bn to the economy. UK manufacturing needs to become more digitally motivated therefore it is important to ensure that we understand the predictors of senior managers' decision to support MIS implementation. The empirical findings of this study provide a better understanding of senior managers' decision to implement MIS.

Theoretical implications

The findings from this study make several contributions to the current literature. Firstly, it reconciles mixed findings of previous research regarding the impact of senior managers' age, education, tenure and some of the elements of the Big Five (i. e., Extraversion and Agreeableness) on R&D spending (Barker and

Mueller, 2002; Serfling, 2014), firm innovation (Hambrick and Mason, 1984; Quazi and Talukder, 2011; Loukil, Yousfi and Cheikh, 2020), long-term venture survival (Ciavarella *et al.*, 2004), and entrepreneurial status (Zhao and Seibert, 2006). Furthermore, this study advances Information systems knowledge by suggesting key contributing factors to senior managers' attitude towards MIS implementation. The literature found mixed results regarding the impact of senior managers' age while this research found that age did not have a significant impact on attitude. Only a few studies have looked into aspects of education i.e., academic discipline and highest level of education (Barker and Mueller, 2002; Ahn, Minshall and Mortara, 2017), the findings of Study 2 suggested that academic discipline is also an important factor and future research should consider both aspects of education when investigating senior managers' attitude and decision making. The results of the present study advance the Upper Echelon Theory and field of study by increasing the predictive power of senior managers' attitude toward the MIS implementation model, while enabling researchers to have a better understanding of the decision making process of senior managers.

Secondly, it is suggested that researchers working on the Upper Echelon Theory adopt career variety as a construct to measure prior career experience, because this construct not only considers past job functions that senior managers performed, but also reflects prior industries they worked in. The findings of Study 2 show that senior managers' career variety helped them to have a better understanding of the benefits of MIS since they had worked at different levels of an organisation.

Thirdly, the findings have important implications for developing the Upper Echelon Theory by including prior involvement in IS projects as a predictor of senior managers' attitude. The findings also have implications for researchers to include prior involvement in IS projects when investigating senior managers' behaviour because it increase the predictive power of the model predicting senior managers' attitude toward MIS implementation. Higher predictive power demonstrates that higher percentage of the variance in senior managers' attitude toward MIS implementation can be explained by the predictor variables.

One of the more significant findings to emerge from this study is that there is a lack of understanding of the implications of senior managers' personality in relation to their decision-making (Hiller and Hambrick, 2005). Understanding how senior managers' make decisions provides insights on the reasons they might not be supportive of MIS implementation, which can lead to a failure of the implementation. This study has found that positive self-image provides more potent predictions of senior managers' behaviours than each of the individual elements (Judge, Erez, *et al.*, 2002). It is therefore important to investigate positive self-image to acquire more information on senior managers' behaviours toward MIS implementation.

Moreover, the findings have important implications for UET researchers indicating that they should use a direct approach to measure positive self-image and use item-parcelling which provides more stable estimates and a more efficient model (Matsunaga, 2008). This approach will prove useful in expanding our understanding of how personality traits of senior managers impact their attitude toward MIS implementation.

Previous research has showed mixed results in terms of the impact of the Big Five elements (i.e., Openness and Neuroticism) and positive self-image (being measured by CSES) on entrepreneurial decisions (Caliendo, Fossen and Kritikos, 2011) and leadership emergence and effectiveness (Judge, Bono, *et al.*, 2002). The study helps improve our understanding of senior managers' attitude toward MIS implementation by considering the mediating role of the Big Five personality traits on the relationship between positive self-image and attitude. The findings of this study gives a better understanding of which tool is better to measure senior managers' personality traits while investigating their attitude toward MIS implementation. The findings highlight the role of individual differences and personality traits on MIS implementation. It is hoped that this encourages further research examining the role of personality traits on other established models in MIS research (i.e., user satisfaction). The predictive power of other MIS research models may be increased by including personality traits, and the Big Five and positive self-image seem to be a useful framework to measure personality traits. The findings suggest that further research should include an investigation of the mediation role of attitude rather than only focusing on causal-effect investigations. Mediation analysis gives better understanding of the underlying mechanism of senior managers' support toward MIS implementation. This research contribute to a deeper understanding of the relationship of senior managers' attitude toward implementation and their characteristics. The present study lays the groundwork for future research into senior managers' attitude toward MIS implementation.

Practical implications

This research can be considered as significant because it may assist managers in implementing MIS to improve organisational efficiencies such as reduction in the lead time of implementation. Studies like this research are often used by senior managers in national and international organisations to analyse the effective implementation of MIS (Laumer, Maier and Weitzel, 2017). MIS is crucial in companies as it helps them to improve their efficiency and achieve organisational success (Thiesse *et al.*, 2015; Padek *et al.*, 2018). Having found in the study that senior managers' attitude towards MIS implementation varies according to their positive self-image, this research could be used by senior managers to self-assess how

they would perform when implementing MIS because according to Dust *et al.* (2020) senior managers assess their values to earn the respect and trust of their employees through making good strategic decisions. Organisations may find this research beneficial because it provides human resources with insights about the attitude and behaviour of senior managers and the support they give in the implementation of MIS. This study specifically focused on the implementation of MIS in the UK manufacturing industry, which may also be of benefit for manufacturing organisations globally (Thiesse *et al.*, 2015; Laumer, Maier and Weitzel, 2017). Most UK manufacturing business, who as mentioned earlier are still in the early stages of MIS implementation and still using old methods such as spreadsheets to carry out the day to day functions of running the business and to inform future planning and decision making. According to Department for Digital, Culture, Media and Sport (2022), 'One of the greatest barriers to the adoption of technology by SMEs is understanding what product to choose. 44% of SMEs think that 'there is too much confusing information' about established technology solutions' which are available'. The UK government has tried to enhance MIS implementation in the UK manufacturing sector by providing financial support e.g., offering 50% of the cost of an approved MIS, up to a maximum of £5,000 and 1:1 mentoring to small businesses and directing them to courses and webinars related to these technologies (Department for Digital, Culture, Media and Sport, 2022). In order to improve the delivery of the assistance being given to SMEs it would be helpful for policy makers, those designing the courses and webinars and providing the mentoring to have an insight into how managers make decisions and how these decisions are effected by the individuals personality traits. A more tailored approach that understand senior managers' decision making processes could help policy makers facilitate and stimulate MIS implementation in UK manufacturers more successfully.

An extrapolation from this study could be that having a senior manager with positive attitude toward implementation of MIS might encourage junior managers and employees to support and accept changes in the organisation and use of a new MIS. Lang and Rybnikova (2018) and Thiesse *et al.* (2015) discuss that CEOs are also responsible for instilling their organisations with strategic values through their strategic choices. This study may also help CEOs to directed to assess their own attitude toward implementation of MIS and reflect on changes they may need to adopt in order to be successful in implementing MIS in their own organisations.

MIS implementation is an important competitive factor for firms and if the implementation is not successful, it may end in loss of money, devaluation on the stock market and difficulty competing with other similar businesses, therefore, HR practitioners can use senior managers' demographics and

experiences as selection tools to guarantee future firm performance. In addition, the results of Study 2 confirmed the findings of Study 1 and illustrate a more in-depth understanding of how senior managers make their decisions to implement MIS in their organisations. These findings have significant implications for organisations when appointing a board level senior manager or promoting a current employee from within an organisation since they can focus more on senior managers' personality traits in their recruitment criteria. This study sheds light on the types of individuals who hold positive beliefs about MIS implementation. Manufacturing organisations could look for these personality traits in job candidates as part of a broader selection process in an interview by using an established the Big Five selections tests.

Limitations

This research was conducted by evaluating the factors that influence the support senior managers provide in implementing MIS. The findings are valid for the manufacturing industry in the UK, but they need to be examined in other industries and countries to investigate the effects of cultural factors and different work environments. Cultural differences may also influence senior managers' attitude which has not been examined in this study. This study only looked into how a board level senior managers' characteristics impact on their attitude, however, in some organisations, strategic decisions such as MIS implementation are made by the senior management team (SMT). Therefore, the differing characteristics of each member of the team might be a moderator in a firms' decision to implement MIS. The researcher only assumed linear relationships between the constructs and non-linear relationships were not tested. This might change the results since there might be interaction effects between different elements of the Big Five not theorised and tested in this study.

Future research

This research has shown a gap in the understanding of the factors that influence the effectiveness of senior managers in implementing MIS. To narrow this gap, future research might use different measures for positive self-image e.g., using internal and external locus of control. This research has demonstrated the importance of the senior managers' positive self-image and their positive attitude in ensuring the effective implementation of MIS. Career variety was measured as the number of different firms, industries, and functional areas in which a manager had worked. It is suspected that prior career experience is more diversified, more dynamic, more innovative and where more global industries might offer a richer experience. The study could be conducted in different countries to investigate the influence

of different cultures on senior managers' attitude. This research has dealt with the impact of senior managers' attitude on their support toward MIS implementation but does not focus on MIS implications. A further study with more focus on MIS implications is therefore suggested. There is much more opportunity for advancing knowledge by studying other risks and rewards associated with MIS implementation.

Given that the researcher worked with two new measures including attitude and support, future research could look into further validating these measures by applying confirmatory factor analysis, convergent and divergent, and predictive validity. Further research could also be conducted to investigate the impact of other individual differences such as decision-making style (Epstein *et al.*, 1996) on senior managers' decision to implement MIS. The impact of senior management team characteristics as a moderator of decision to implement MIS is another area for future studies to investigate. Whilst this study did not confirm that Openness to experience has an impact on senior managers' attitude, it would be very useful to investigate other potential moderators of the relationship between Openness and attitude. The majority of UK manufacturers are at early stages of MIS implementation and most of them still use old methods of monitoring and running their business such as spreadsheets, therefore, future studies investigating the adoption patterns of early adopters and late adopters of MIS could provide useful information. Further research is required to investigate the impact of senior managers' academic discipline in business and management on their attitude toward MIS implementation.

Conclusion

This thesis set out to investigate the impact of senior managers' characteristics and personality traits on their attitude toward MIS implementation. This thesis has identified that senior managers' tenure, career variety, education background (holding at least a college degree), prior involvement in IS projects and personality traits to have a significant impact on their attitude toward MIS implementation, with age not being found to be a significant predictor of attitude. One of the major findings of the first study was that senior managers' personality traits (i.e., positive self-image) is the strongest predictor of their attitude toward MIS implementation. The qualitative findings confirmed the findings of the first study. Most of the elements of the Big Five appeared in the interviews which led to a further investigation of personality traits. The results of that investigation show that four of the Big Five personality dimensions have a significant impact on senior managers' attitude toward MIS implementation. Agreeableness and conscientiousness appear to be the personality constructs which most strongly and consistently have an

impact on senior managers' attitude toward implementation. Only Openness to experience appears not to have a significant impact on attitude. The findings of present study suggest that in the presence of the Big Five, the impact of positive self-image is substantially reduced. This could be further explored in future studies. Although PSI is not as commonly used as the Big Five, given the fact that it is much shorter in length and it takes much shorter time to complete the questionnaire, practitioners are still able to use it to assess personality traits of senior managers in early stages of recruitment and selection processes.

The study contributes to the Upper Echelon field in various ways. Firstly, it suggests career variety is a more comprehensive construct to use when evaluating a senior managers' prior career experience. Career variety includes senior managers' prior job functions, the differing industry sectors and different firms they have worked in. The literature mostly relies on job functions which does not provide a comprehensive picture of a senior managers' prior experience. Secondly, the literature mostly measures education as a scale variable rather than a categorical variable. In this study, education was analysed as different dummy variables to understand the impact of having different levels of education. The findings have implications for practitioners in the recruitment process to consider senior managers with college degree having as positive an attitude toward MIS implementation as senior managers with a higher education degree. Thirdly, prior involvement in IS projects was identified as a predictor of attitude. This is currently neglected in the Upper Echelon Theory so this could extend the managerial background characteristics used in the UET. Fourthly, the impact of positive self-image on attitude was studied in this large-scale study. This concept has been neglected in the literature due to senior managers' unwillingness to fill in questionnaires so any studies investigating this concept were limited due to their small sample size. Furthermore, the item-parcelling techniques which was suggested as an effective technique to analyse positive self-image construct, was used and it made the model more stable. Finally, mediation analysis of senior managers' attitude provides better understanding of the underlying process of senior managers' support rather than only focusing on purely cause and effect relationships which has been the approach used in the literature.

[Data accessibility statement](#)

The anonymised data underpinning this thesis can be found at figshare.com with DOI:
10.6084/m9.figshare.25212497

Appendices:

Appendix A: Ethical Clearance Approval



College of Engineering, Design and Physical Sciences Research Ethics Committee
Brunel University London
Kingston Lane
Uxbridge
UB8 3PH
United Kingdom
www.brunel.ac.uk

18 June 2020

LETTER OF CONDITIONAL APPROVAL

APPROVAL HAS BEEN GRANTED FOR THIS STUDY TO BE CARRIED OUT BETWEEN 30/06/2020 AND 03/08/2020

Applicant (s): Miss Nahid Izadpanah Mehrkish

Project Title: Factors affecting the top managers support for implementation of management information system in UK manufacturing organizations

Reference: 23148-LR-Jun/2020- 25887-4

Dear Miss Nahid Izadpanah Mehrkish

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:

- Please ensure that you monitor and adhere to all up-to-date Government health advice for the duration of your project.
- 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 give details of the cost of the research and how much will be funded by the Department and where will the rest be funded. Please could you discuss this with your supervisor before starting the research.
- No face to face interviews have been approved only online research has been agreed.

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.
- 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.

A handwritten signature in cursive script, appearing to read "Hua Zhao".

Professor Hua Zhao

Chair of the College of Engineering, Design and Physical Sciences Research Ethics Committee

Brunel University London

22 October 2021

LETTER OF APPROVAL (Conditional)

APPROVAL HAS BEEN GRANTED FOR THIS STUDY TO BE CARRIED OUT BETWEEN 31/10/2021 AND 30/04/2022

Applicant (s): Miss Nahid izadpanah Mehrkish

Project Title: Factors affecting senior managers' decisions to support management information systems implementation in UK manufacturing organisations

Reference: 32637-LR-Oct/2021- 34559-2

Dear Miss Nahid izadpanah Mehrkish

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:

- **Approval is given for remote (online/telephone) research activity only. Face-to-face activity and/or travel will require approval by way of an amendment.**
- **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.**
- **You must be very careful when obtaining and utilising email addresses to ensure that you do not breach data protection law. You must only use email addresses obtained lawfully, and you must not share those email addresses with other participants. When introducing yourself and your study, you should advise them why you have emailed them, and where you obtained their contact details. If you are emailing a large group of participants, then you MUST use the BCC email function. NO email addresses should be visible to any other participants, or this will be considered a major breach of GDPR and may lead to disciplinary action. that the use of email addresses is restricted to the distribution of a survey (or other recruitment materials) and will not be further used or distributed.**
- **Please remove the witness statement from your consent form, as this is only relevant to vulnerable participants. This point can be addressed outside of the BREO system.**
- In addition to the above, 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.
- 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.





20 September 2022

LETTER OF APPROVAL

APPROVAL HAS BEEN GRANTED FOR THIS STUDY TO BE CARRIED OUT BETWEEN 20/09/2022 AND 15/11/2022

Applicant (s): Miss Nahid izadpanah Mehrkish

Project Title: Factors affecting board level senior managers' decisions to support management information systems implementation in UK manufacturing organisations

Reference: 36559-A-Sep/2022- 41572-1

Dear Miss Nahid izadpanah Mehrkish

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:

- **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 Simon Taylor

Chair of the College of Engineering, Design and Physical Sciences Research Ethics Committee

Brunel University London

21 April 2022

LETTER OF APPROVAL (CONDITIONAL)

APPROVAL HAS BEEN GRANTED FOR THIS STUDY TO BE CARRIED OUT BETWEEN 21/04/2022 AND 31/08/2022

Applicant (s): Miss Nahid izadpanah Mehrkish

Project Title: Factors affecting board level senior managers' decisions to support management information systems implementation in UK manufacturing organisations

Reference: 36559-LR-Mar/2022- 38901-1

Dear Miss Nahid izadpanah Mehrkish

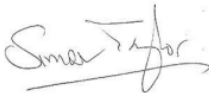
The Research Ethics Committee has considered the above application recently submitted by you.

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:

- **Approval is given for remote (online/telephone) research activity only. Face-to-face activity and/or travel will require approval by way of an amendment.**
- **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 ensure that a separate recruitment email is sent to each participant or that the BCC field is used. Under no circumstance should participant details be made visible to each other. You should also add a line to your introductory message stating where you obtained their contact details
- It is good protocol to offer your participants a range of age brackets to choose from, rather than to ask them to state their age outright
- These two points may be addressed outside of the BREO system

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.
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- 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 Simon Taylor

Appendix B1: Participant Information Sheet

Study title

Factors affecting senior managers' decisions when implementing Management Information Systems (MIS) in UK manufacturing organisations

Invitation Paragraph

'You are being asked 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 information carefully and discuss it with others if you wish. Ask me/us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

Thank you for reading this.'

Why have I been invited to participate?

I am working on the factors affecting senior management support on the implementation of MIS in the UK manufacturing organizations. The information that is obtained from this questionnaire provides executives insights regarding how they might overcome the biases associated with their experiences and dispositions. I will send you the summary of the findings.

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 you may be asked to sign a consent form. You may withdraw from the study at any time during the project without comment or penalty, but once your survey is submitted, it cannot be withdrawn as we have no way of identifying it.

What will happen to me if I take part?

If you decide to take part you are still free to withdraw your data, without giving a reason, until the point at which you submit your answers/hand in your questionnaire.'

What are the possible disadvantages and risks of taking part?

‘There are no anticipated disadvantages or risks associated with taking part in this study.’

What are the possible benefits of taking part?

The information that is obtained from this questionnaire provides executives insights regarding how they might overcome the biases associated with their experiences and dispositions. I will send you the summary of the findings.

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 until the end of this study. Any information about you which leaves the University will have all your identifying information removed. With your permission,

‘If during the course of the research evidence of harm or misconduct come to light, then it may be necessary to break confidentiality. We will tell you at the time if we think we need to do this, and let you know what will happen next.’

Will I be recorded, and how will the recording be used?

‘No recording will be made as part of this study’.

What are the indemnity arrangements?

‘Brunel University London provides appropriate insurance cover for research which has received ethical approval.’

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

If you need any further information regarding this study, please do not hesitate to contact me. If you have any complaints, please contact Chair of the Research Ethics Committee.

Contact details of researcher: Nahid.IzadpanahMehrkish@brunel.ac.uk

Contact details of my supervisor: Susan.grant@brunel.ac.uk

Contact details of Chair of the Research Ethics Committee: res-ethics@brunel.ac.uk.

Each individual will be given a copy of the information sheet and signed consent form to keep.

Appendix B2: Questionnaire (Study 1)

Dear participant

I am writing to ask for your assistance as a senior manager, to engage as a participant in my research. My name is Nahid Izadpanah Mehrkish, a Doctoral researcher, at the Department of Mechanical and Aerospace Engineering at Brunel University London. I would like to invite you to participate in an online questionnaire for my research. My research is seeking to explore factors affecting the senior managers' support on implementation of *management information systems (MIS)* i.e., ERP, SRM, CRM, etc. Your response is very important to the success of this research. Please note that there are no 'right' or 'wrong' answers; please respond according to your current thoughts. The information obtained during this questionnaire will remain confidential and any identifiers will be removed so that none of the participants are identifiable. The information that is obtained from this online questionnaire provides valuable information that will lead us to the understanding of how these factors influence senior managers' attitude toward MIS implementation.

Sincerely,

Please check the box that best describes you where applicable otherwise put a number:

1- What is your gender?

Male Female Non-binary

2- What is your age? years months

Education

3- What is your highest level of education?

No formal qualification

Diploma

College degree

University first degree

Master's degree or higher

Tenure

- 4- How many years have you held your current position? (Please use the below boxes to specify the years and months you have had the position, for example, '1' year and '9 months'. If you have held the position for exactly 2 years, put '2' years and '0' month(s))

years months

Career variety

- 5- How many distinct organisations have you worked in?
- 6- How many years were you working before you became a senior manager? (Please use the below boxes to specify the years and months you were working, for example, '1' year and '9 months' If you were working for exactly 2 years, put '2' years and '0' month(s)

years months

- 7- 7-How many distinct industries have you worked in? (distinct industry)

- 8- What were you prior job functions?

Production/operations

R&D/engineering

Accounting/finance

Management/administration

Marketing/sales

Personnel/labour

Relations/law

Other (please specify)

Prior involvement in IS projects

- 9- How many Information system (IS) implementation projects have you been involved in? (project manager or responsible in the implementation process)

Please state whether you agree or disagree with each statement

Positive self-image

Q10.1: I am very confident I get the success I deserve in life

Strongly disagree 1 2 3 4 5 Strongly agree

Q10.2: Sometimes, I feel depressed

Strongly disagree 1 2 3 4 5 Strongly agree

Q10.3: Sometimes, when I fail I feel worthless

Strongly disagree 1 2 3 4 5 Strongly agree

Q10.4: When I try, I almost always succeed

Strongly disagree 1 2 3 4 5 Strongly agree

Q10.5: I complete tasks successfully

Strongly disagree 1 2 3 4 5 Strongly agree

Q10.6: Sometimes, I do not feel in control of my work

Strongly disagree 1 2 3 4 5 Strongly agree

Q10.7: Overall, I am really satisfied with myself

Strongly disagree 1 2 3 4 5 Strongly agree

Q10.8: I am filled with doubts about my competence

Strongly disagree 1 2 3 4 5 Strongly agree

Q10.9: I almost always determine what will happen in my life

Strongly disagree 1 2 3 4 5 Strongly agree

Q10.10: I do not feel in control of my success in my career

Strongly disagree 1 2 3 4 5 Strongly agree

Q10.11: I am capable of coping with most of my problems

Strongly disagree 1 2 3 4 5 Strongly agree

Q10.12: There are times when things look pretty bleak and hopeless to me

Strongly disagree 1 2 3 4 5 Strongly agree

Attitude toward MIS implementation

Q11.1: I don't see a value in MIS implementation

Strongly disagree 1 2 3 4 5 Strongly agree

Q11.2: The cost of MIS implementation outweighs the benefits

Strongly disagree 1 2 3 4 5 Strongly agree

Q11.3: Using MIS helps me to be more efficient and save time

Strongly disagree 1 2 3 4 5 Strongly agree

Q11.4: Using MIS would be beneficial to both me and my firm

Strongly disagree 1 2 3 4 5 Strongly agree

Support toward MIS implementation

Q12.1: I would be ready to put necessary effort to support MIS implementation

Strongly disagree 1 2 3 4 5 Strongly agree

Q12.2: I would use effective change management strategies and processes to support MIS implementation.

Strongly disagree 1 2 3 4 5 Strongly agree

Q12.3: Supporting MIS implementation is a good idea

Strongly disagree 1 2 3 4 5 Strongly agree

Q12.4: The likelihood that I would support MIS implementation is very high

Strongly disagree 1 2 3 4 5 Strongly agree

Q12.5: I am ready to actively get involved in MIS implementation

Strongly disagree 1 2 3 4 5 Strongly agree

Appendix B3: Study 1 questionnaire (Pre-test version)

A: individual demographics

This section includes questions regarding your demographic information.

Please check the answer which best describes you for each question.

1- Gender

- a) Male b) female

2- Age

- a) 20 years old and below
b) 21 - 35 years old
c) 36 - 50 years old
d) 51 years old and above

3- Education

- a) Diploma and under diploma
b) College/ university
c) Master degree or higher

4- How many years have you held your current position?

- 1 2 3
4 5 More than 5

5- How many years have you been a top manager of other firms before taking the current position?

- 1 2 3
4 5 More than 5

6- How many years have you been working in your organization before becoming its top manager?

- 1 2 3
4 5 More than 5

7- How many years have you been working in manufacturing industry?

- 1 2 3
 4 5 More than 5

8- What were your prior job functions? (You can tick more than one) (Hamori and Koyuncu, 2014)

- a) Output functions (sales, marketing, product R&D)
 b) Throughput functions (operations, process R&D)
 c) Administrative functions (omitted category; includes finance and administration)
 d) Other functions (law, consulting, academia, etc.).

Please answer the questions according to your personal opinion (Please tick only one box).

B:

Construct	No.	Statement	Scale					
			1	2	3	4	5	
CSEs	1	I am <i>very</i> confident I get the success I deserve in life.	Strongly agree					Strongly disagree
	2	Sometimes I feel depressed.	Strongly agree					Strongly disagree
	3	Sometimes when I fail I feel worthless.	Strongly agree					Strongly disagree
	4	When I try, I almost always succeed	Strongly agree					Strongly disagree
	5	I complete tasks successfully.	Strongly agree					Strongly disagree
	6	Sometimes, I do not feel in control of my work	Strongly agree					Strongly disagree
	7	Overall, I am <i>really</i> satisfied with myself	Strongly agree					Strongly disagree
	8	I am filled with doubts about my competence	Strongly agree					Strongly disagree
	9	I <i>almost always</i> determine what will happen in my life	Strongly agree					Strongly disagree

Construct	No.	Statement	Scale					
			1	2	3	4	5	
	10	I do not feel in control of my success in my career	Strongly agree					Strongly disagree
	11	I am capable of coping with most of my problems	Strongly agree					Strongly disagree
	12	There are times when things look pretty bleak and hopeless to me.	Strongly agree					(Judge et al, 2003)
H5	13	I am confident that using MIS is a good idea.	Strongly agree					Strongly disagree
H6a and H6b	14	I feel more confident to make strategic decisions as I gain more experience in my career.	Strongly agree					Strongly disagree
Attitude toward MIS implementation	15	Using MIS is a ----- idea.	Bad idea					Good idea
	16	Using MIS is a ----- idea.	Foolish idea					Wise idea
	17	I ----- the idea of using MIS.	Dislike					Dislike
	18	Using MIS would be ----- --	Unpleasant					Pleasant
Supporting MIS implementation	19	The idea of supporting MIS implementation is appealing.	Strongly disagree					Strongly agree
	20	I like the idea of supporting MIS implementation	Strongly disagree					Strongly agree
	21	Supporting MIS implementation is a good idea	Strongly disagree					Strongly agree
	22	The likelihood that I would support MIS implementation is:	Very low					Very high
	23	The probability that I would consider supporting MIS implementation is:	Very low					Very high

C: What do you think is the most important factor that can make you implement management information systems in your organization?

- 1.
- 2.
- .
- .
- .

Appendix B3-1

The table below is the original CSES proposed by Judge et al. (2003). Four items from the original scale were slightly modified. In Statement 1, the word 'very' was added before the word 'confident'; in statement 3 in the original measure the word 'generally' got changed to the phrase 'almost always'; in statement 7, the word 'really' was added before the word 'satisfied'; in statement 9, the phrase 'almost always' was added before the word 'determine'.

1	2	3	4	5
Strongly disagree	Disagree	Neutral	Agree	Strongly agree
<hr/>				
1.	- I am confident I get the success I deserve in life.			
2.	-Sometimes, I feel depressed. (r)			
3.	- When I try, I generally succeed.			
4.	- Sometimes when I fail I feel worthless. (r)			
5.	- I complete tasks successfully.			
6.	- Sometimes, I do not feel in control of my work. (r)			
7.	- Overall, I am satisfied with myself.			
8.	- I am filled with doubts about my competence. (r)			
9.	- I determine what will happen in my life.			
10.	- I do not feel in control of my success in my career. (r)			
11.	- I am capable of coping with most of my problems.			
12.	-There are times when things look pretty bleak and hopeless to me. (r)			

r = reverse-scored. This measure is non-proprietary (free) and may be used without permission.

Appendix D1: Collected Data (Study 1)

This is just a snapshot of the data that was collected and analysed as presenting the whole data on a word document would cause distortion.

The screenshot shows the SPSS Variable View window. The menu bar includes File, Edit, View, Data, Transform, Analyze, Graphs, Utilities, Extensions, Window, and Help. The toolbar contains icons for file operations, data manipulation, and analysis. The main area displays a list of 31 variables with the following columns: Name, Type, Width, Decimals, Label, Values, Missing, Columns, Align, Measure, and Role.

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	status	Numeric	1	0	status: Particip...	{1, Terminat...	None	9	Right	Ordinal	Input
2	gender	Numeric	1	0	qD1: What is y...	{1, Male}...	None	16	Right	Nominal	Input
3	age	Numeric	19	0	Age	None	None	19	Right	Scale	Input
4	education	Numeric	1	0	Highest level of ...	{1, No forma...	None	1	Right	Ordinal	Input
5	tenure	Numeric	19	0	q1r1: Enter yea...	None	None	6	Right	Scale	Input
6	q1r2	Numeric	19	0	q1r2: and additi...	None	None	8	Right	Scale	Input
7	distinct_org...	Numeric	19	0	q2r1: How man...	None	None	10	Right	Ordinal	Input
8	years_befor...	Numeric	19	0	q3r1: Enter yea...	None	None	9	Right	Scale	Input
9	q3r2	Numeric	19	0	q3r2: and additi...	None	None	7	Right	Ordinal	Input
10	distinct_ind...	Numeric	19	0	q4r1: How man...	None	None	7	Right	Ordinal	Input
11	job_functions1	Numeric	1	0	q5r1: Productio...	{0, NO TO: ...	None	1	Right	Ordinal	Input
12	Job_functio...	Numeric	1	0	q5r2: R&D/engi...	{0, NO TO: ...	None	1	Right	Ordinal	Input
13	Job_functio...	Numeric	1	0	q5r3: Accountin...	{0, NO TO: ...	None	1	Right	Ordinal	Input
14	Job_functio...	Numeric	1	0	q5r4: Managem...	{0, NO TO: ...	None	1	Right	Ordinal	Input
15	Job_function5	Numeric	1	0	q5r5: Marketin...	{0, NO TO: ...	None	1	Right	Ordinal	Input
16	Job_functio...	Numeric	1	0	q5r6: Personnel...	{0, NO TO: ...	None	1	Right	Ordinal	Input
17	Job_functio...	Numeric	1	0	q5r7: Relations/...	{0, NO TO: ...	None	1	Right	Ordinal	Input
18	Job_functio...	Numeric	1	0	q5r8: Other (ple...	{0, NO TO: ...	None	1	Right	Ordinal	Input
19	q5r8oe	String	512	0	q5r8oe: What w...	None	None	5	Left	Nominal	Input
20	number_ISp...	Numeric	19	0	Number of IS pr...	None	None	7	Right	Scale	Input
21	self_efficacy1	Numeric	1	0	q6r2: I am very ...	{1, Strongly ...	None	12	Right	Ordinal	Input
22	emotional_s...	Numeric	1	0	q6r4: Sometim...	{1, Strongly ...	None	17	Right	Ordinal	Input
23	self_esteem1	Numeric	1	0	q6r5: Sometim...	{1, Strongly ...	None	1	Right	Ordinal	Input
24	self_efficacy2	Numeric	1	0	q6r6: When I tr...	{1, Strongly ...	None	20	Right	Ordinal	Input
25	self_efficacy3	Numeric	1	0	q6r7: I complet...	{1, Strongly ...	None	1	Right	Ordinal	Input
26	locus_of_co...	Numeric	1	0	q6r9: Sometim...	{1, Strongly ...	None	1	Right	Ordinal	Input
27	self_esteem2	Numeric	1	0	q6r10: Overall, I...	{1, Strongly ...	None	1	Right	Ordinal	Input
28	emotional_s...	Numeric	1	0	q6r11: I am fille...	{1, Strongly ...	None	13	Right	Ordinal	Input
29	Locus_of_c...	Numeric	1	0	q6r12: I almost ...	{1, Strongly ...	None	1	Right	Ordinal	Input
30	locus_of_co...	Numeric	1	0	q6r13: I do not f...	{1, Strongly ...	None	1	Right	Ordinal	Input
31	locus_of_co...	Numeric	1	0	q7r1: I am capa...	{1, Strongly ...	None	1	Right	Ordinal	Input

At the bottom of the window, there are tabs for 'Data View' and 'Variable View', with 'Variable View' currently selected. The status bar at the bottom right reads 'IBM SPSS Statistics Processor is'.

	status	gender	age	education	tenure	q1r2	distinct_organiza- tion	years_befor- e_manager	q3r2	distinct_industrie- s	job_functio- ns1	Job_fu- nction- s2	Job_f- uncti- ons3	Jc b un	Jc b un	Jc b un	Jc b un	q5r8 oe	number _Sproje- cts	sv
1	3	1	35	4	3	0	3	2	0	2	0	0	0	1	1	0	0		15	
2	3	2	20	3	1	2	1	1	1	1	1	1	1	0	0	0	0		1	
3	3	1	42	4	15	2	3	6	4	1	0	1	0	0	0	0	0		3	
4	3	1	45	3	10	2	2	3	4	2	1	0	0	0	0	0	0		2	
5	3	1	48	5	3	2	7	15	0	3	1	0	0	1	0	0	0		5	
6	3	1	45	4	2	8	5	10	7	2	0	0	0	1	0	0	0		6	
7	3	2	44	5	5	9	4	8	2	1	0	0	0	1	0	0	0		3	
8	3	1	45	4	20	6	5	7	4	3	0	0	0	1	0	0	0		4	
9	3	1	33	5	2	0	4	6	0	2	1	0	0	1	0	0	0		2	
10	3	2	46	4	5	7	5	13	6	3	0	0	0	1	0	0	0		5	
11	3	2	48	4	20	2	6	8	0	4	0	0	0	0	1	0	0		3	
12	3	1	48	3	25	3	5	8	1	5	1	0	0	0	0	0	0		4	
13	3	1	40	5	3	6	2	2	3	1	0	0	0	1	0	0	0		3	
14	3	1	47	4	5	3	4	11	0	2	0	1	0	1	0	0	0		5	
15	3	1	45	5	5	0	3	8	8	1	0	0	0	1	0	0	0		5	
16	3	1	39	5	1	7	2	7	0	2	1	0	0	1	0	0	0		1	
17	3	2	44	4	4	9	5	9	4	4	0	0	0	1	0	0	0		3	
18	3	1	39	3	3	5	2	12	0	2	0	0	0	1	0	0	0		3	
19	3	1	40	4	4	0	5	9	0	3	0	0	0	1	1	0	0		6	
20	3	2	42	1	9	4	2	15	2	2	1	0	0	1	0	0	0		5	
21	3	1	51	5	6	0	8	17	0	5	0	0	0	1	1	0	0		6	
22	3	2	30	2	3	2	2	1	3	1	1	1	0	0	0	0	0		2	
23	3	1	48	3	3	0	5	10	2	3	0	0	0	1	0	0	0		3	
24	3	1	45	4	7	5	4	15	3	4	0	0	0	1	0	0	0		4	
25	3	1	44	3	1	9	2	3	0	2	1	0	0	0	0	0	0		2	
26	3	1	33	3	4	8	7	7	0	3	1	0	0	1	1	1	0		40	
27	3	1	43	5	3	4	5	10	0	4	0	0	0	1	0	0	0		6	
28	3	1	40	5	7	2	2	5	0	2	1	0	0	0	0	0	0		11	

Appendix D3: Collected Data (Study 3)

FullDataSet.sav [DataSet2] - IBM SPSS Statistics Data Editor

File Edit View Data Transform Analyze Graphs Utilities Extensions Window Help

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	ParticipantID	Numeric	8	0		None	None	8	Right	Scale	Input
2	Gender	Numeric	1	0		{1, Male}...	None	14	Right	Nominal	Input
3	Age	Numeric	1	0		{1, 18-24}...	None	8	Right	Ordinal	Input
4	Education	Numeric	1	0		{1, No degre...	None	9	Right	Ordinal	Input
5	Tenure	Numeric	1	0		{1, < 1 year}...	None	11	Right	Ordinal	Input
6	DistinctOrg...	Numeric	34	0		None	None	16	Right	Scale	Input
7	YearsBefore...	Numeric	32	0		None	None	17	Right	Scale	Input
8	DistinctIndu...	Numeric	1	0		None	None	13	Right	Scale	Input
9	ISprojects	Numeric	11	0		None	None	11	Right	Scale	Input
10	JobFunction...	Numeric	1	0		{0, No}...	None	8	Right	Nominal	Input
11	JobFunction...	Numeric	1	0		{0, No}...	None	15	Right	Nominal	Input
12	JobFunction...	Numeric	1	0		{0, No}...	None	1	Right	Nominal	Input
13	JobFunction...	Numeric	1	0		{0, No}...	None	1	Right	Nominal	Input
14	JobFunction...	Numeric	1	0		{0, No}...	None	1	Right	Nominal	Input
15	JobFunction...	Numeric	1	0		{0, No}...	None	1	Right	Nominal	Input
16	CompanyAge	Numeric	1	0		{1, < 5 year...	None	9	Right	Ordinal	Input
17	CompanySize	Numeric	1	0		{1, 1-4}...	None	13	Right	Ordinal	Input
18	Turnover	Numeric	1	0		{1, <£500k}...	None	11	Right	Ordinal	Input
19	CSES_1	Numeric	1	0		{1, Strong di...	None	10	Right	Ordinal	Input
20	CSES_2r	Numeric	1	0		{1, Strong di...	None	1	Right	Ordinal	Input
21	CSES_3r	Numeric	1	0		{1, Strong di...	None	25	Right	Ordinal	Input
22	CSES_4	Numeric	1	0		{1, Strong di...	None	11	Right	Ordinal	Input
23	CSES_5	Numeric	1	0		{1, Strong di...	None	14	Right	Ordinal	Input
24	CSES_6r	Numeric	1	0		{1, Strong di...	None	11	Right	Ordinal	Input
25	CSES_7	Numeric	1	0		{1, Strong di...	None	9	Right	Ordinal	Input
26	CSES_8r	Numeric	1	0		{1, Strong di...	None	7	Right	Ordinal	Input
27	CSES_9	Numeric	1	0		{1, Strong di...	None	17	Right	Ordinal	Input
28	CSES_10r	Numeric	1	0		{1, Strong di...	None	13	Right	Ordinal	Input
29	CSES_11	Numeric	1	0		{1, Strong di...	None	9	Right	Ordinal	Input
30	PSI_12r	Numeric	1	0		{1, Strong di...	None	14	Right	Ordinal	Input
31	Attitude_1r	Numeric	1	0	R	{1, Strong di...	None	1	Right	Ordinal	Input

Data View Variable View

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
31	Attitude_1r	Numeric	1	0	R	{1, Strong di...	None	1	Right	Ordinal	Input
32	Attitude_2r	Numeric	1	0	R	{1, Strong di...	None	1	Right	Ordinal	Input
33	Attitude_3	Numeric	1	0		{1, Strong di...	None	1	Right	Ordinal	Input
34	Attitude_4	Numeric	1	0		{1, Strong di...	None	1	Right	Ordinal	Input
35	Support_1	Numeric	1	0		{1, Strong di...	None	1	Right	Ordinal	Input
36	Support_2	Numeric	1	0		{1, Strong di...	None	1	Right	Ordinal	Input
37	Support_3	Numeric	1	0		{1, Strong di...	None	1	Right	Ordinal	Input
38	Support_4	Numeric	1	0		{1, Strong di...	None	1	Right	Ordinal	Input
39	Support_5	Numeric	1	0		{1, Strong di...	None	1	Right	Ordinal	Input
40	EXT1	Numeric	1	0		{1, Strong di...	None	10	Right	Ordinal	Input
41	AGR1r	Numeric	1	0	r	{1, Strong di...	None	11	Right	Ordinal	Input
42	CONS1	Numeric	1	0		{1, Strong di...	None	5	Right	Ordinal	Input
43	EMS1	Numeric	1	0		{1, Strong di...	None	7	Right	Ordinal	Input
44	OPEN1	Numeric	1	0		{1, Strong di...	None	7	Right	Ordinal	Input
45	EXT2r	Numeric	1	0	r	{1, Strong di...	None	7	Right	Ordinal	Input
46	AGR2	Numeric	1	0		{1, Strong di...	None	7	Right	Ordinal	Input
47	CONS2r	Numeric	1	0	r	{1, Strong di...	None	8	Right	Ordinal	Input
48	EMS2r	Numeric	1	0	r	{1, Strong di...	None	7	Right	Ordinal	Input
49	OPEN2	Numeric	1	0		{1, Strong di...	None	7	Right	Ordinal	Input
50	EXT3	Numeric	1	0		{1, Strong di...	None	8	Right	Ordinal	Input
51	AGR3r	Numeric	1	0	r	{1, Strong di...	None	5	Right	Ordinal	Input
52	CONS3	Numeric	1	0		{1, Strong di...	None	8	Right	Ordinal	Input
53	EMS3	Numeric	1	0		{1, Strong di...	None	7	Right	Ordinal	Input
54	OPEN3	Numeric	1	0		{1, Strong di...	None	9	Right	Ordinal	Input
55	EXT4	Numeric	1	0		{1, Strong di...	None	11	Right	Ordinal	Input
56	AGR4	Numeric	1	0		{1, Strong di...	None	7	Right	Ordinal	Input
57	CONS4r	Numeric	1	0	r	{1, Strong di...	None	7	Right	Ordinal	Input
58	EMS4	Numeric	1	0		{1, Strong di...	None	8	Right	Ordinal	Input
59	OPEM4	Numeric	1	0		{1, Strong di...	None	9	Right	Ordinal	Input
60	EXT5r	Numeric	1	0	r	{1, Strong di...	None	8	Right	Ordinal	Input
61	AGR5	Numeric	1	0		{1, Strong di...	None	9	Right	Ordinal	Input
4											

Appendix F: Little MCAR Test

Little MCAR test- PSI

Univariate Statistics

	N	Mean	Std. Deviation	Missing		No. of Extremes ^a	
				Count	Percent	Low	High
PSI_1	96	3.99	.827	0	.0	5	0
PSI_2r	96	2.77	1.138	0	.0	0	0
PSI_3r	95	2.43	1.145	1	1.0	0	0
PSI_4	96	3.90	.864	0	.0	.	.
PSI_5	96	4.15	.767	0	.0	3	0
PSI_6r	96	2.91	1.134	0	.0	0	0
PSI_7	96	3.89	.881	0	.0	.	.
PSI_8r	96	2.22	1.048	0	.0	0	0
PSI_9	96	3.52	1.056	0	.0	6	0
PSI_10r	96	2.36	1.134	0	.0	0	4
PSI_11	96	4.15	.767	0	.0	4	0
PSI_12r	95	2.46	1.109	1	1.0	0	2

a. Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR).

EM Means^a

PSI_1	PSI_2r	PSI_3r	PSI_4	PSI_5	PSI_6r	PSI_7	PSI_8r	PSI_9	PSI_10 r	PSI_11	PSI_12 r
3.99	2.77	2.44	3.90	4.15	2.91	3.89	2.22	3.52	2.36	4.15	2.48

a. Little's MCAR test: Chi-Square = 21.060, DF = 22, Sig. = .517

Univariate Statistics

	N	Mean	Std. Deviation	Missing		No. of Extremes ^a	
				Count	Percent	Low	High
Attitude_1	96	1.97	1.041	0	.0	0	9
Attitude_2	96	2.49	1.066	0	.0	0	5
Attitude_3	96	3.77	1.000	0	.0	6	0
Attitude_4	96	3.85	.995	0	.0	6	0

a. Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR).

Univariate Statistics

	N	Mean	Std. Deviation	Missing		No. of Extremes ^a	
				Count	Percent	Low	High
Support_1	96	3.72	.855	0	.0	3	0
Support_2	96	3.82	.858	0	.0	3	0
Support_3	96	3.95	.863	0	.0	.	.
Support_4	96	3.79	.917	0	.0	3	0
Support_5	96	3.63	.921	0	.0	3	0

a. Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR).

Univariate Statistics

	N	Mean	Std. Deviation	Missing		No. of Extremes ^a	
				Count	Percent	Low	High
EXT1	95	3.96	.910	1	1.0	8	0
EXT2	96	2.75	1.046	0	.0	0	7
EXT3	96	4.02	.808	0	.0	4	0
EXT4	95	4.04	.651	1	1.0	.	.
EXT5	96	2.67	1.176	0	.0	0	0
EXT6	96	3.74	.849	0	.0	1	0
EXT7	96	2.67	1.194	0	.0	0	0
EXT8	95	3.89	.905	1	1.0	.	.

a. Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR).

EM Means^a

EXT1	EXT2	EXT3	EXT4	EXT5	EXT6	EXT7	EXT8
3.96	2.75	4.02	4.04	2.67	3.74	2.67	3.90

a. Little's MCAR test: Chi-Square = 16.604, DF = 21, Sig. = .735

Univariate Statistics

	N	Mean	Std. Deviation	Missing		No. of Extremes ^a	
				Count	Percent	Low	High
AGR1	96	2.68	.989	0	.0	0	3
AGR3	96	2.16	1.029	0	.0	0	0
AGR2	96	4.05	.800	0	.0	4	0
AGR4	95	3.74	.981	1	1.0	3	0
AGR5	96	3.93	.785	0	.0	.	.
AGR6	96	2.46	1.075	0	.0	0	4
AGR7	96	4.00	.754	0	.0	.	.
AGR8	96	2.35	1.231	0	.0	0	0
AGR9	95	4.01	.831	1	1.0	5	0

a. Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR).

EM Means^a

AGR1	AGR3	AGR2	AGR4	AGR5	AGR6	AGR7	AGR8	AGR9
2.68	2.16	4.05	3.74	3.93	2.46	4.00	2.35	4.01

a. Little's MCAR test: Chi-Square = 14.858, DF = 16, Sig. = .535

Univariate Statistics

	N	Mean	Std. Deviation	Missing		No. of Extremes ^a	
				Count	Percent	Low	High
CONS1	96	4.06	.792	0	.0	4	0
CONS2	96	2.54	1.025	0	.0	0	4
CONS3	95	4.37	.685	1	1.0	2	0
CONS4	95	2.61	1.094	1	1.0	0	5
CONS5	96	2.17	1.073	0	.0	0	0
CONS6	96	3.93	.943	0	.0	0	0
CONS7	96	4.02	.767	0	.0	3	0
CONS8	95	3.88	.849	1	1.0	.	.
CONS9	96	3.17	1.092	0	.0	0	0

a. Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR).

EM Means^a

CONS1	CONS2	CONS3	CONS4	CONS5	CONS6	CONS7	CONS8	CONS9
4.06	2.54	4.35	2.61	2.17	3.93	4.02	3.88	3.17

a. Little's MCAR test: Chi-Square = 18.663, DF = 15, Sig. = .229

Univariate Statistics

	N	Mean	Std. Deviation	Missing		No. of Extremes ^a	
				Count	Percent	Low	High
EMS1	96	2.01	.957	0	.0	0	6
EMS2	96	3.73	.900	0	.0	1	0
EMS3	95	3.03	1.115	1	1.0	0	0
EMS4	95	2.84	1.104	1	1.0	0	0
EMS5	96	3.85	.917	0	.0	0	0
EMS6	96	2.90	1.051	0	.0	0	0
EMS7	96	3.85	.906	0	.0	1	0
EMS8	96	2.43	1.023	0	.0	0	2

a. Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR).

EM Means^a

EMS1	EMS2	EMS3	EMS4	EMS5	EMS6	EMS7	EMS8
2.01	3.73	3.03	2.84	3.85	2.90	3.85	2.43

a. Little's MCAR test: Chi-Square = 7.478, DF = 6, Sig. = .279

Univariate Statistics

	N	Mean	Std. Deviation	Missing		No. of Extremes ^a	
				Count	Percent	Low	High
OPEN1	96	4.02	.794	0	.0	3	0
OPEN2	96	4.25	.696	0	.0	1	0
OPEN3	95	3.81	.937	1	1.0	1	0
OPEM4	96	3.96	.882	0	.0	0	0
OPEN5	96	3.79	.832	0	.0	1	0
OPEN6	96	3.83	.925	0	.0	1	0
OPEN7	96	2.66	1.113	0	.0	0	5
OPEN8	96	3.94	.831	0	.0	.	.
OPEN9	96	3.03	1.192	0	.0	0	0
OPEN10	96	3.19	1.069	0	.0	0	0

a. Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR).

EM Means^a

OPEN1	OPEN2	OPEN3	OPEM4	OPEN5	OPEN6	OPEN7	OPEN8	OPEN9	OPEN10
4.02	4.25	3.80	3.96	3.79	3.83	2.66	3.94	3.03	3.19

a. Little's MCAR test: Chi-Square = 8.873, DF = 9, Sig. = .449

Univariate Statistics

	N	Mean	Std. Deviation	Missing		No. of Extremes ^a	
				Count	Percent	Low	High
ISprojects	94	6.31	16.013	2	2.1	0	11

a. Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR).

Univariate Statistics

	N	Mean	Std. Deviation	Missing		No. of Extremes ^a	
				Count	Percent	Low	High
DistinctOrganisation	96	5.15	10.050	0	.0	0	9

a. Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR).

Univariate Statistics

	N	Mean	Std. Deviation	Missing		No. of Extremes ^a	
				Count	Percent	Low	High
YearsBeforeSM	96	7.61	5.060	0	.0	0	4

a. Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR).

Univariate Statistics

	N	Mean	Std. Deviation	Missing		No. of Extremes ^a	
				Count	Percent	Low	High
DistinctIndustries	96	2.90	1.619	0	.0	0	3

a. Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR).

Univariate Statistics

	N	Mean	Std. Deviation	Missing		No. of Extremes ^{a,b}	
				Count	Percent	Low	High
Gender	96	1.06	.243	0	.0	.	.

a. Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR).

b. . indicates that the inter-quartile range (IQR) is zero.

Univariate Statistics

	N	Mean	Std. Deviation	Missing		No. of Extremes ^a	
				Count	Percent	Low	High
Age	96	3.09	1.016	0	.0	0	0

a. Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR).

Univariate Statistics

	N	Mean	Std. Deviation	Missing		No. of Extremes ^{a,b}	
				Count	Percent	Low	High
Education	96	2.69	.654	0	.0	.	.

a. Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR).

b. . indicates that the inter-quartile range (IQR) is zero.

Univariate Statistics

	N	Mean	Std. Deviation	Missing		No. of Extremes ^a	
				Count	Percent	Low	High
Tenure	96	2.63	.700	0	.0	0	0

a. Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR).

Univariate Statistics

	N	Mean	Std. Deviation	Missing		No. of Extremes ^a	
				Count	Percent	Low	High
CompanyAge	95	2.53	.756	1	1.0	0	0

a. Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR).

Univariate Statistics

	N	Mean	Std. Deviation	Missing		No. of Extremes ^a	
				Count	Percent	Low	High
CompanySize	93	2.43	.772	3	3.1	0	0

a. Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR).

Univariate Statistics

	N	Mean	Std. Deviation	Missing		No. of Extremes ^a	
				Count	Percent	Low	High
Turnover	95	2.34	.858	1	1.0	0	0

a. Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR).

Appendix G: Common Method Bias Test

PLS-SEM algorithm analyses with two constructs: senior managers' attitude toward MIS implementation, positive self-image, and senior managers' support toward MIS implementation

Collinearity Statistics with attitude as the dependent variable

Model 1	Collinearity Statistics Variance Inflation Factor (VIF)
Positive self-image	2.46
support	2.49

Collinearity Statistics with support as the dependent variable

Model 2	Collinearity Statistics Variance Inflation Factor (VIF)
Positive self-image	2.56
attitude	2.47

Collinearity Statistics with positive self-image as the dependent variable

Model 3	Collinearity Statistics Variance Inflation Factor (VIF)
support	2.96
attitude	2.48

Appendix H: Word Frequency Query For Open Ended Question (Study 1)

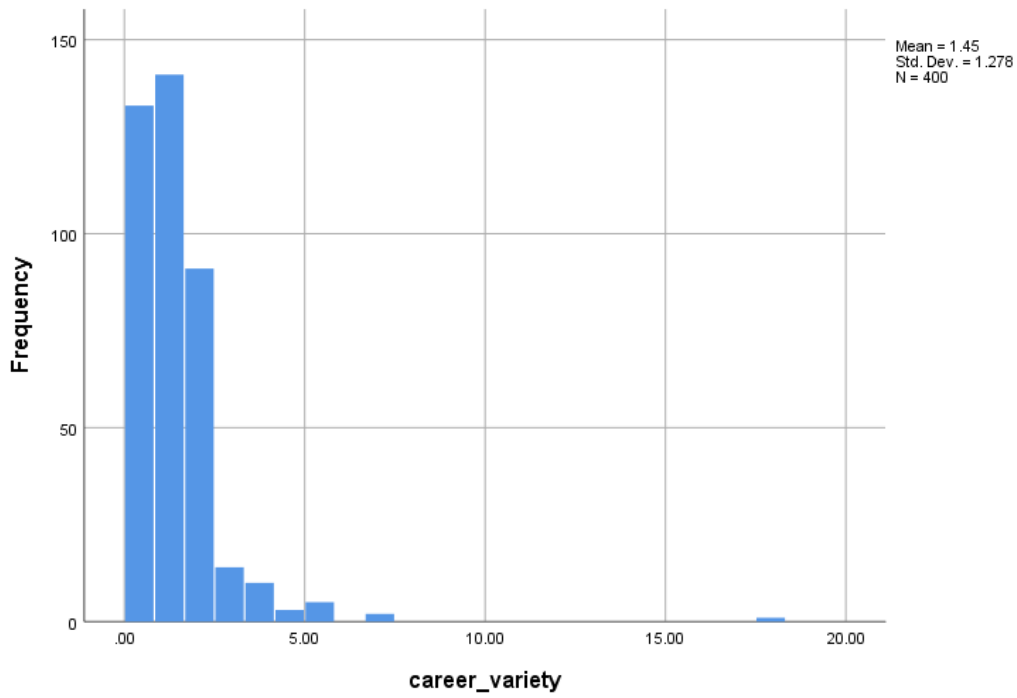
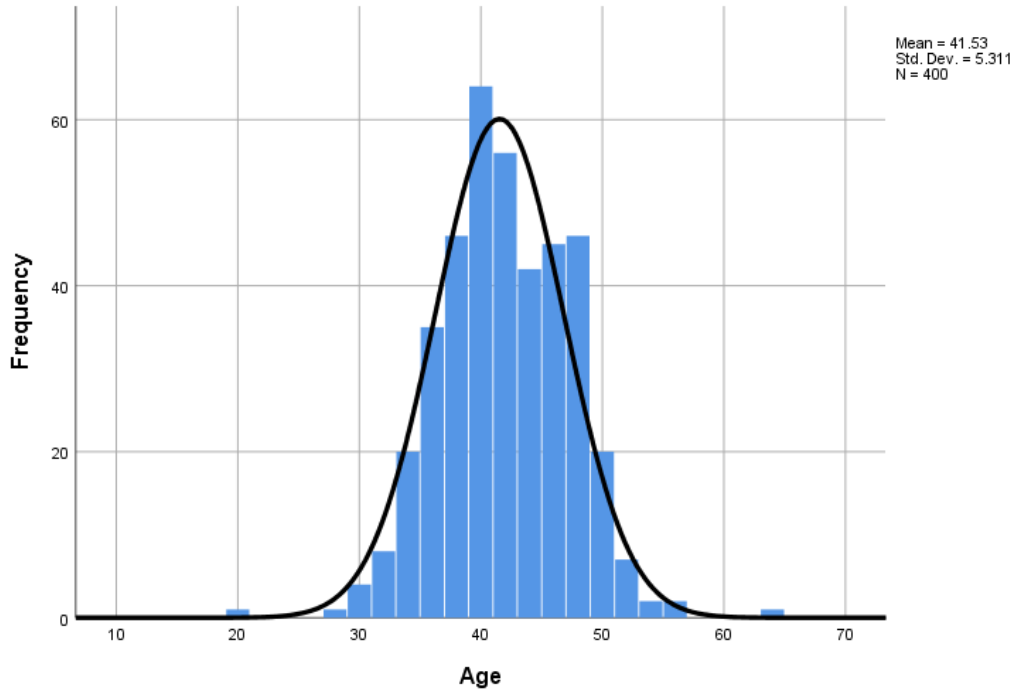
First 50 most frequent words

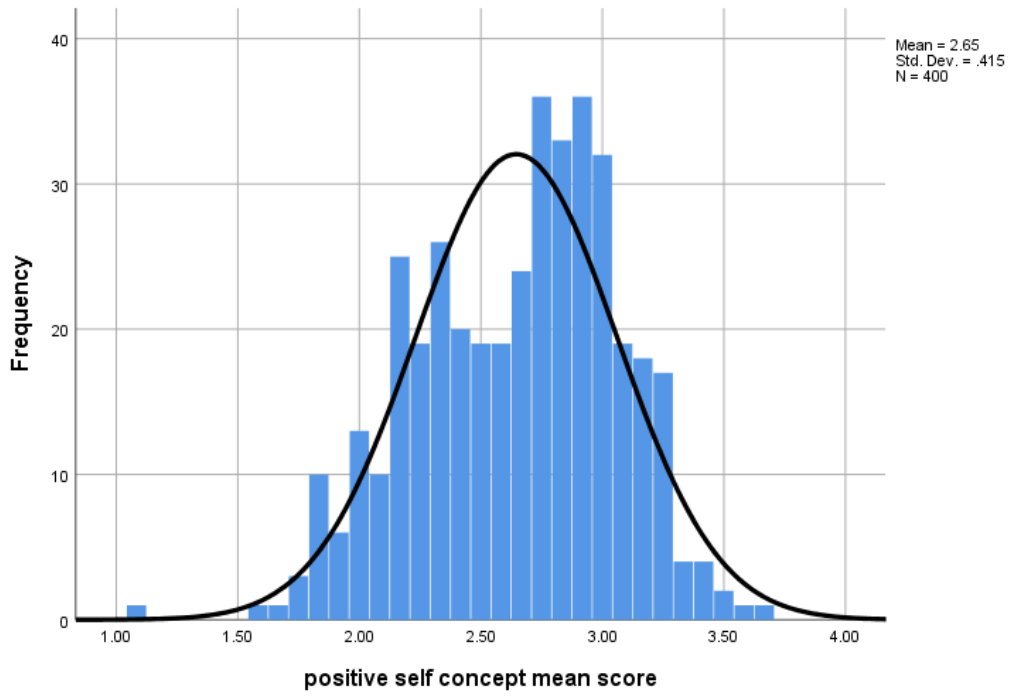
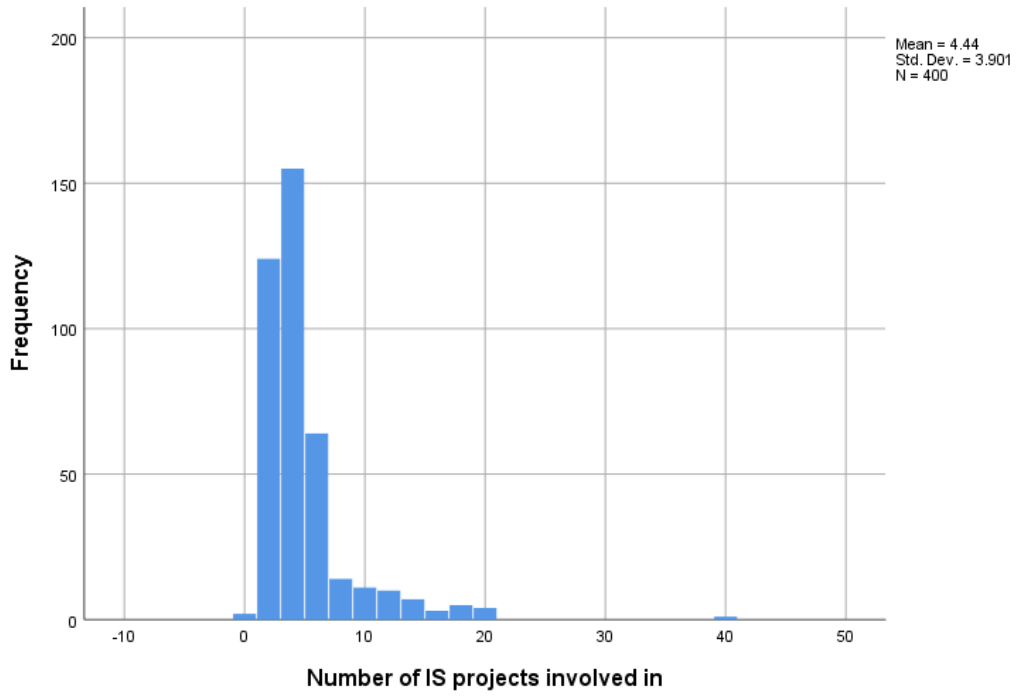
Word	Length	Count	Weighted Percentage (%)	Similar Words
decision	8	25	5.64	decision
information	11	24	5.42	information, informed
controlling	11	15	3.39	control, controlling
data	4	13	2.93	data
efficient	9	12	2.71	efficiency, efficient, efficiently
effective	9	12	2.71	effective, effectively, effectiveness
improve	7	11	2.48	improve, improved, improvement, improves, improving
operations	10	10	2.26	operation, operational, operations
time	4	9	2.03	time, timely
productivity	12	8	1.81	production, productivity
planning	8	7	1.58	planning
support	7	6	1.35	support
performance	11	6	1.35	performance, performs
accurate	8	5	1.13	accurate, accurately
business	8	5	1.13	business
increase	8	5	1.13	increase, increasing
process	7	5	1.13	process, processes, processing

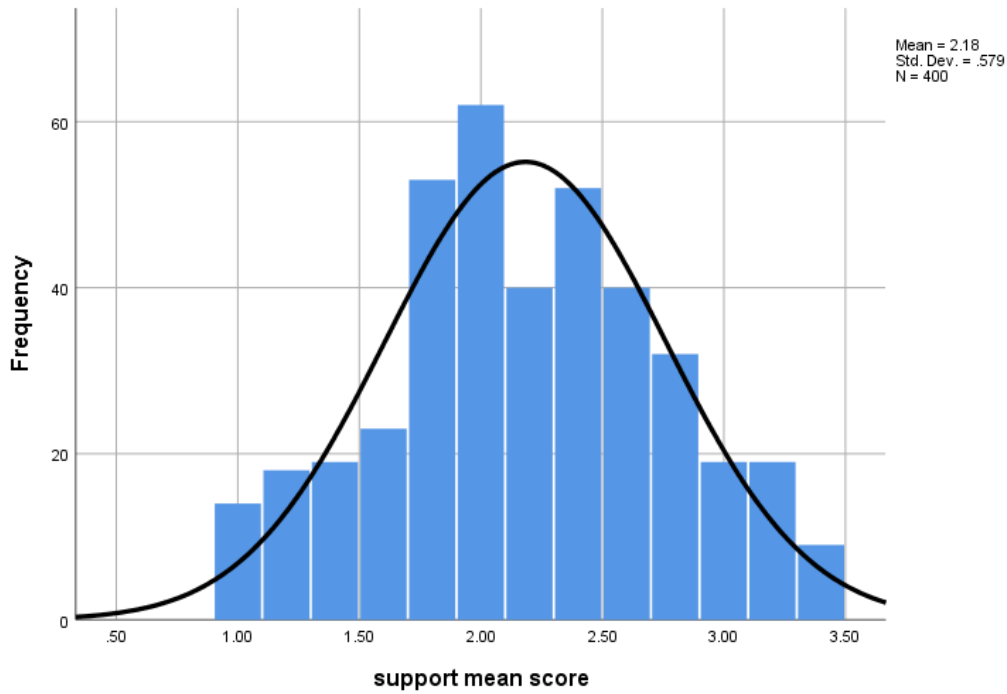
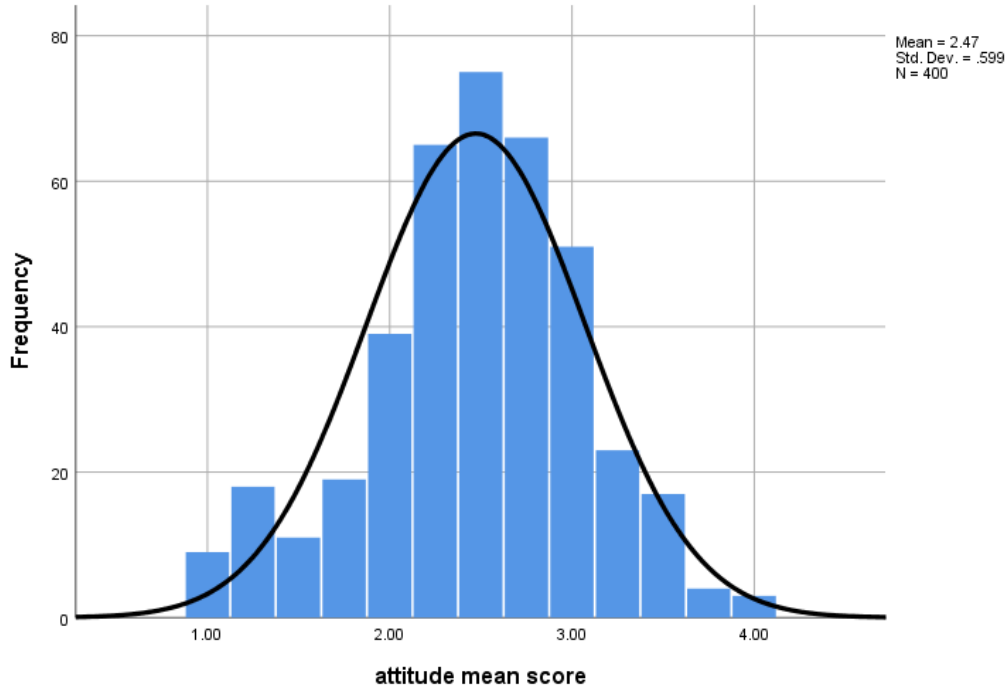
Word	Length	Count	Weighted Percentage (%)	Similar Words
quality	7	5	1.13	quality
beneficial	10	4	0.90	beneficial
benefit	7	4	0.90	benefit, benefits
change	6	4	0.90	change, changes
department	10	4	0.90	department, departments
finance	7	4	0.90	finance, finances
overall	7	4	0.90	overall
reliable	8	4	0.90	reliable
requirements	12	4	0.90	requirements, requires
team	4	4	0.90	team, teams
aspects	7	3	0.68	aspect, aspects
easily	6	3	0.68	easily
human	5	3	0.68	human
market	6	3	0.68	market, marketing, markets
resource	8	3	0.68	resource, resources
strategic	9	3	0.68	strategic
strategies	10	3	0.68	strategies, strategy
success	7	3	0.68	success, successful, successive
ability	7	2	0.45	ability
amount	6	2	0.45	amount
analysis	8	2	0.45	analysis
availability	12	2	0.45	availability, available
becomes	7	2	0.45	becomes
beneficiary	11	2	0.45	beneficiary

Word	Length	Count	Weighted Percentage (%)	Similar Words
building	8	2	0.45	building
classified	10	2	0.45	classified
Communication	13	2	0.45	communication, communications
coordinating	12	2	0.45	coordinating, coordination
cost	4	2	0.45	cost
customer	8	2	0.45	customer, customers
ease	4	2	0.45	ease
easy	4	2	0.45	easy
essential	9	2	0.45	essential

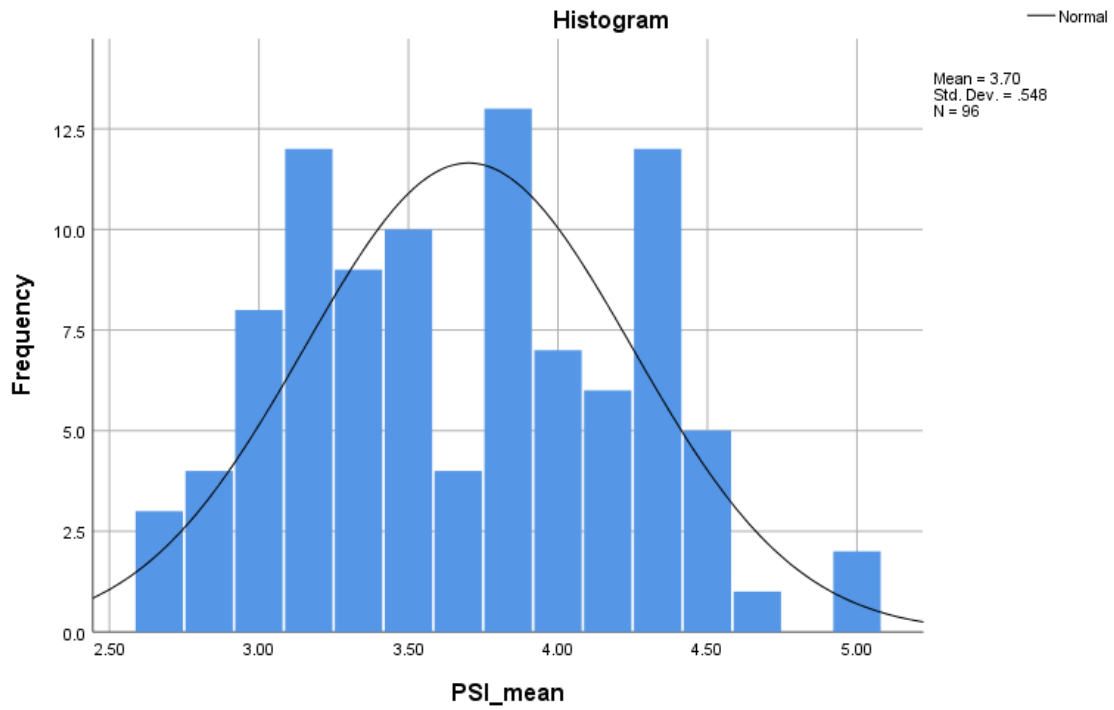
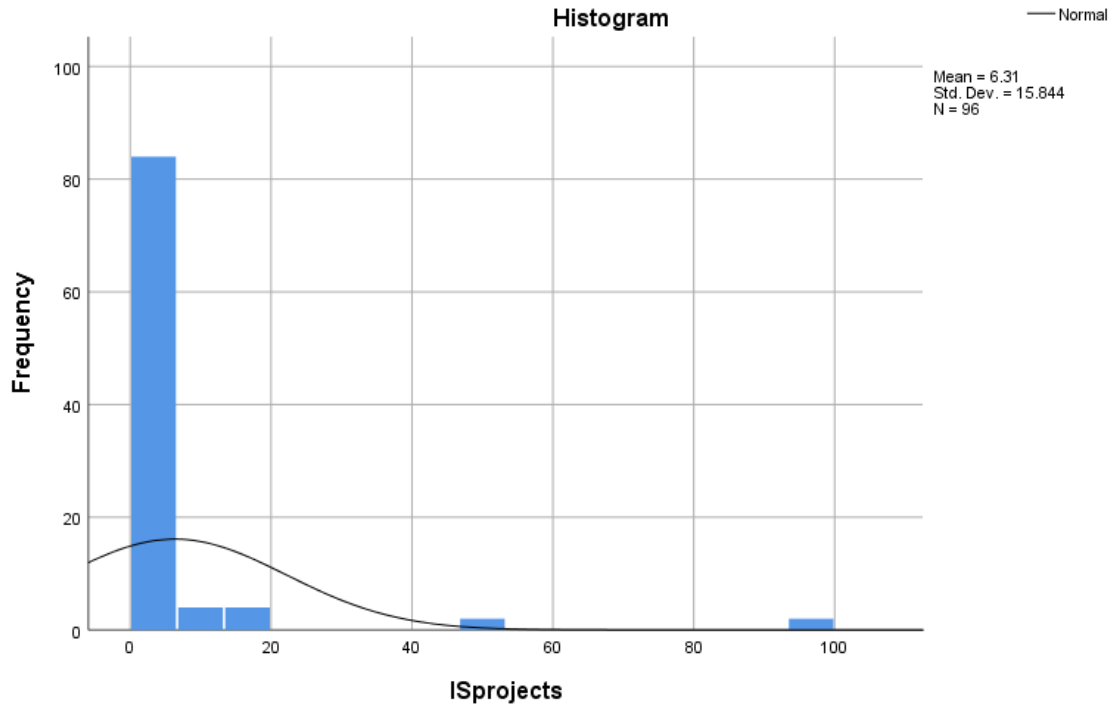
Appendix I: Normality Tests (Study 1)

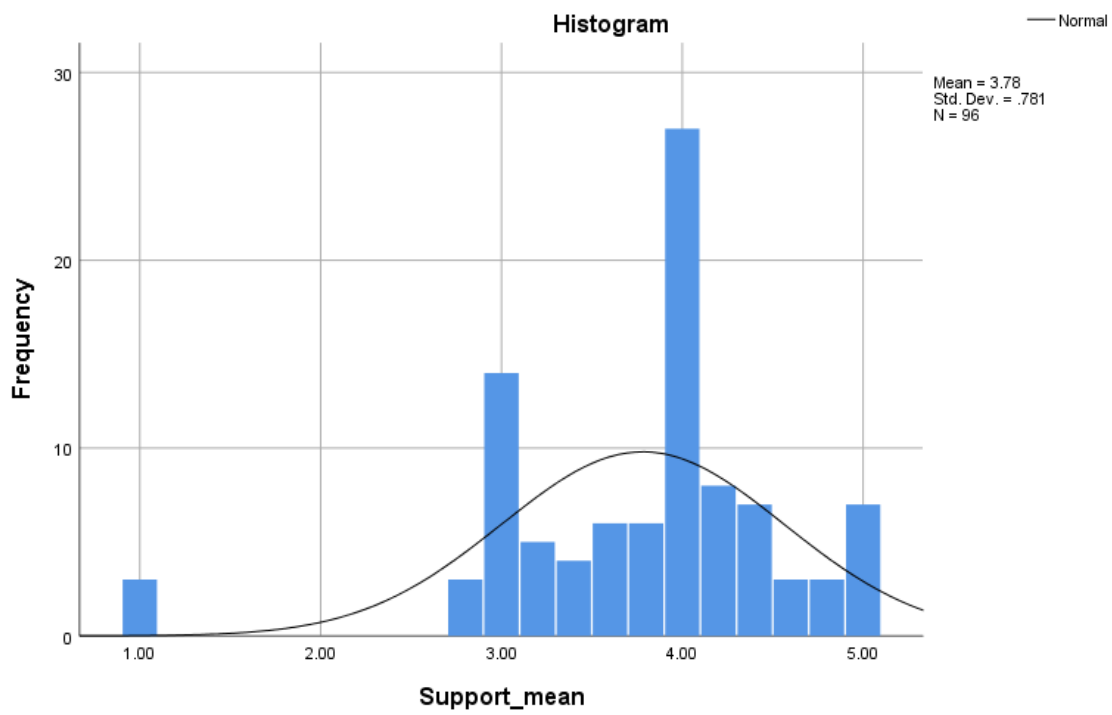
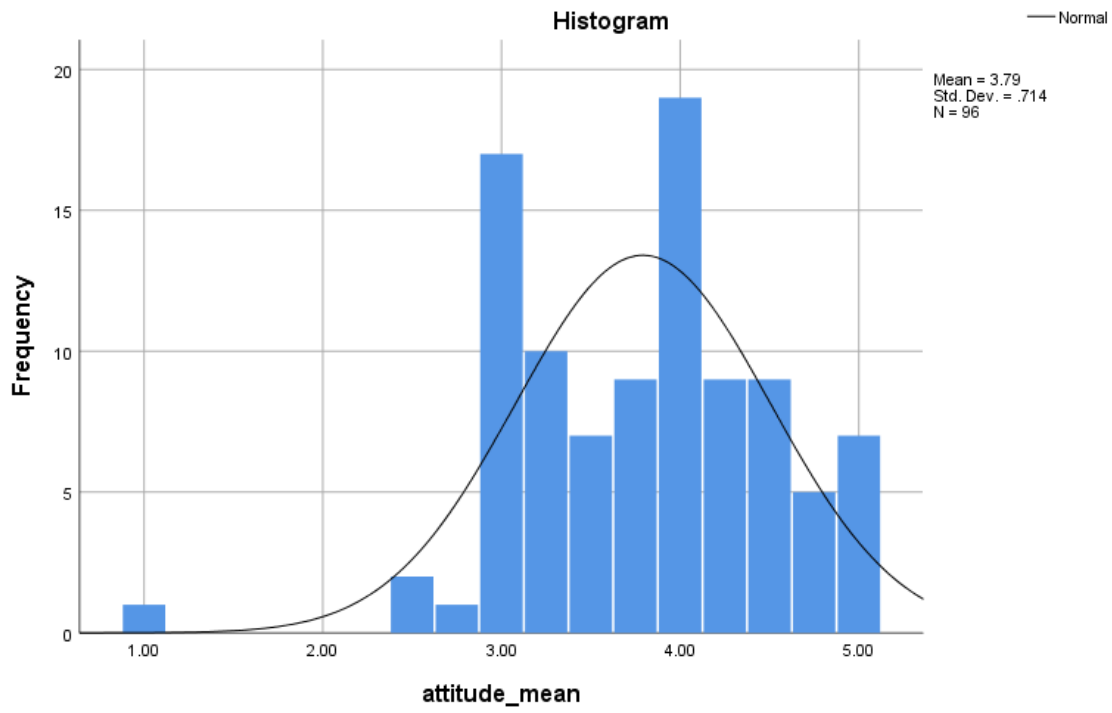


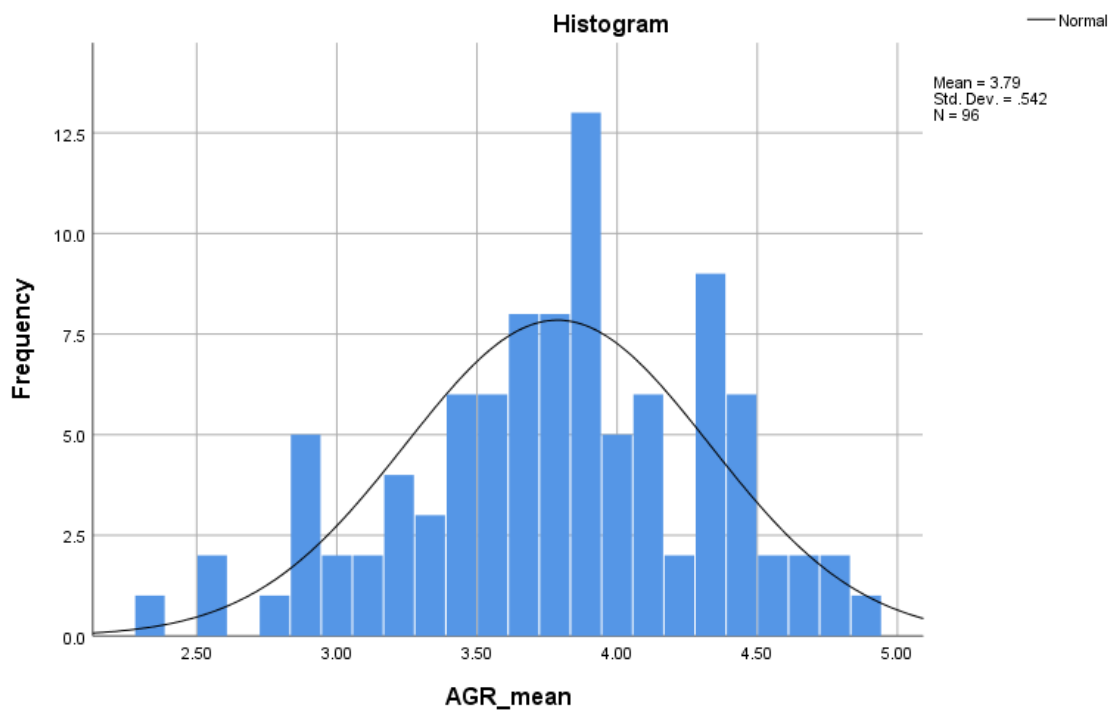
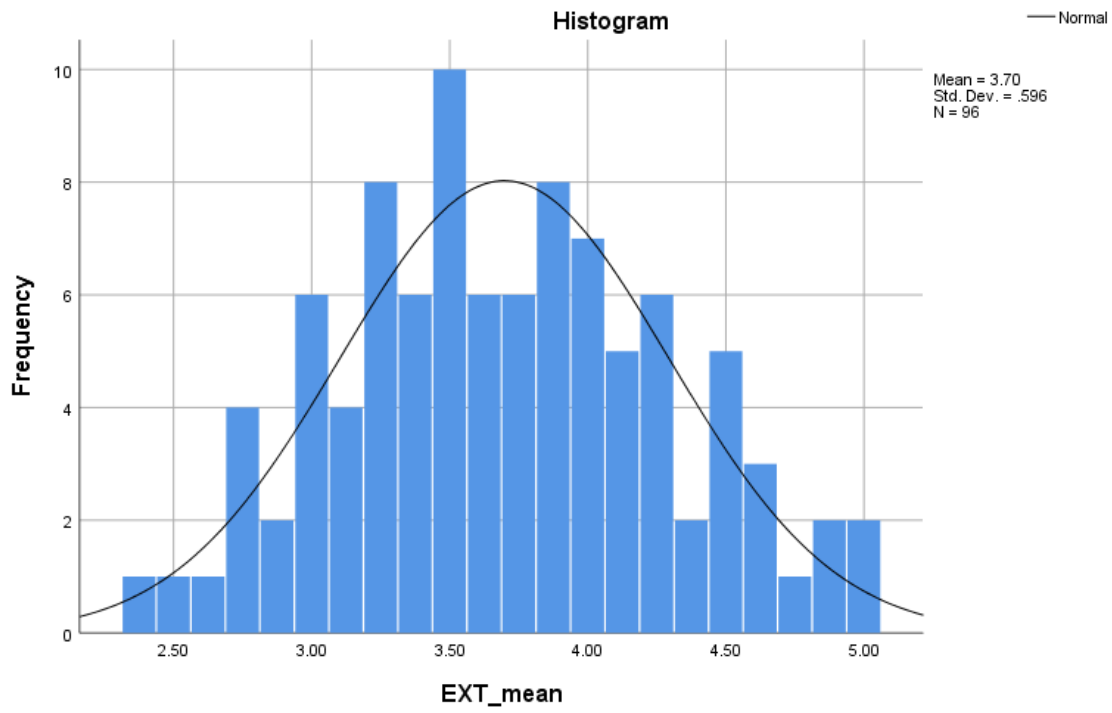


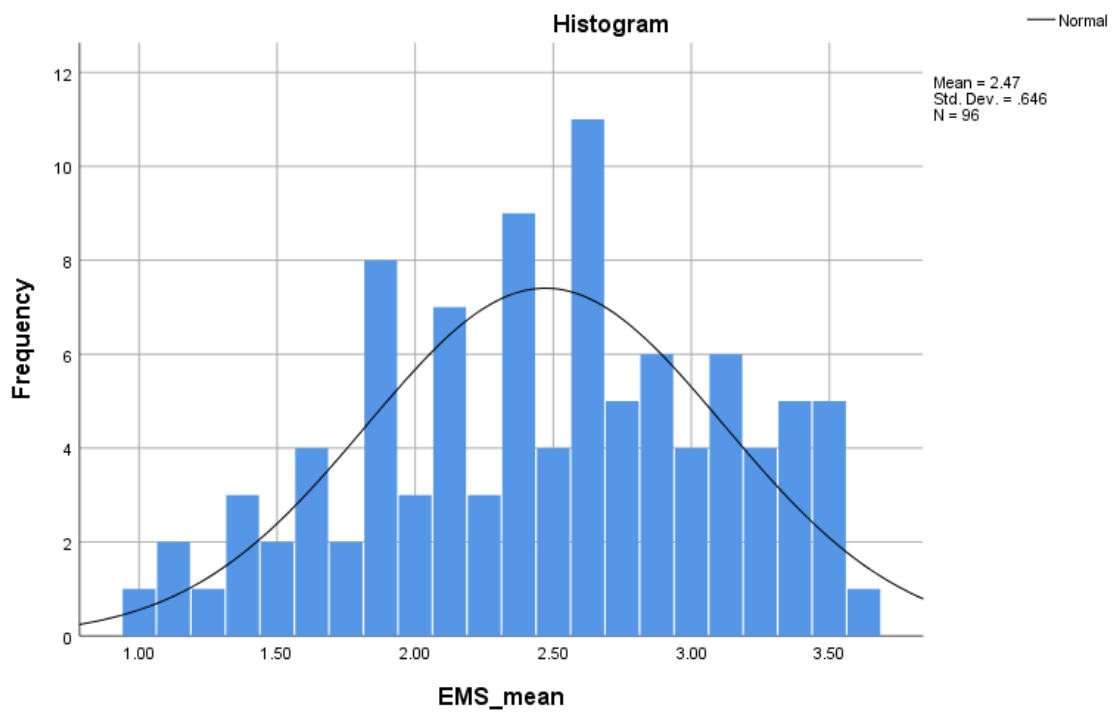
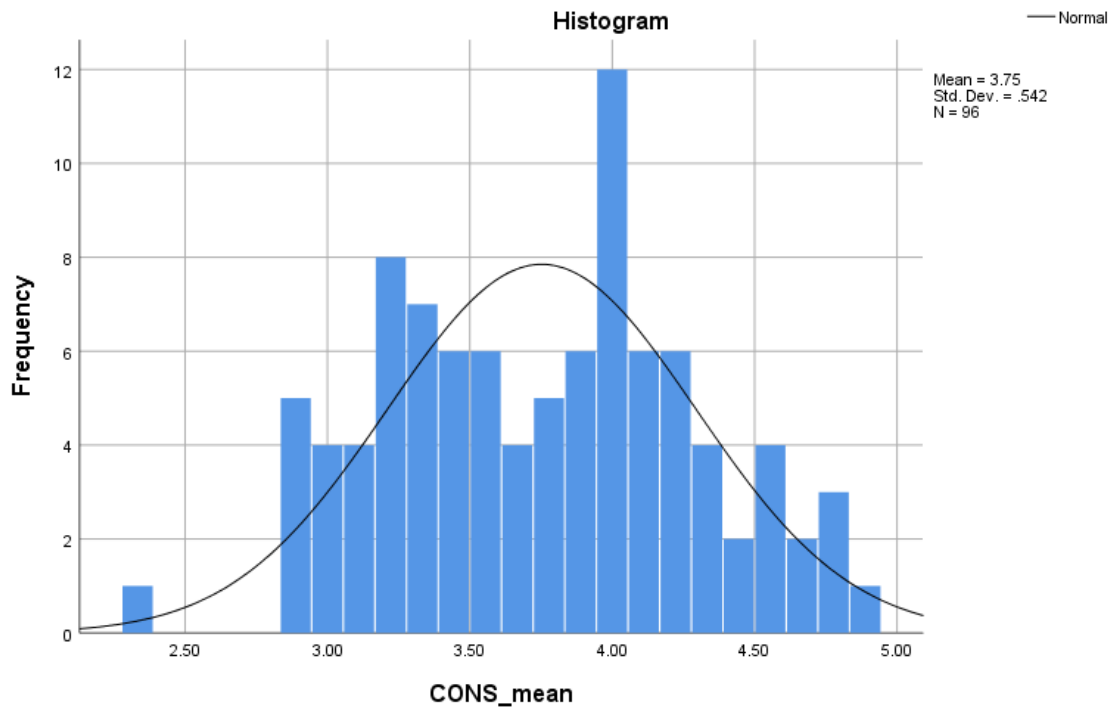


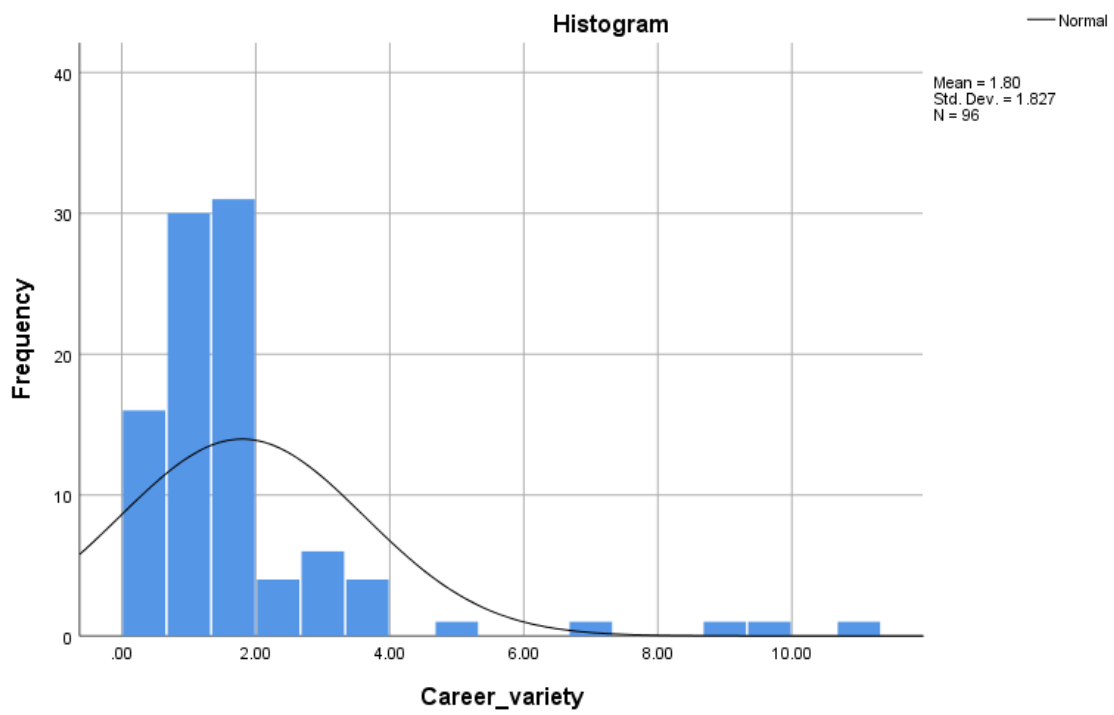
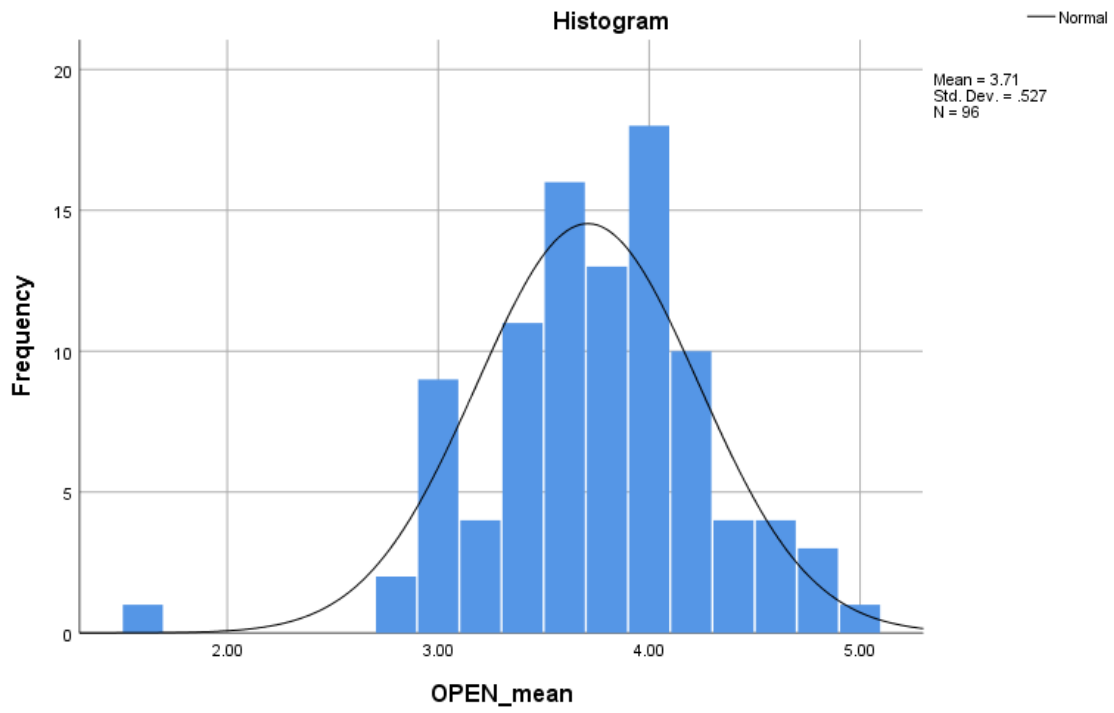
Appendix J: Normality Tests (Study 3)

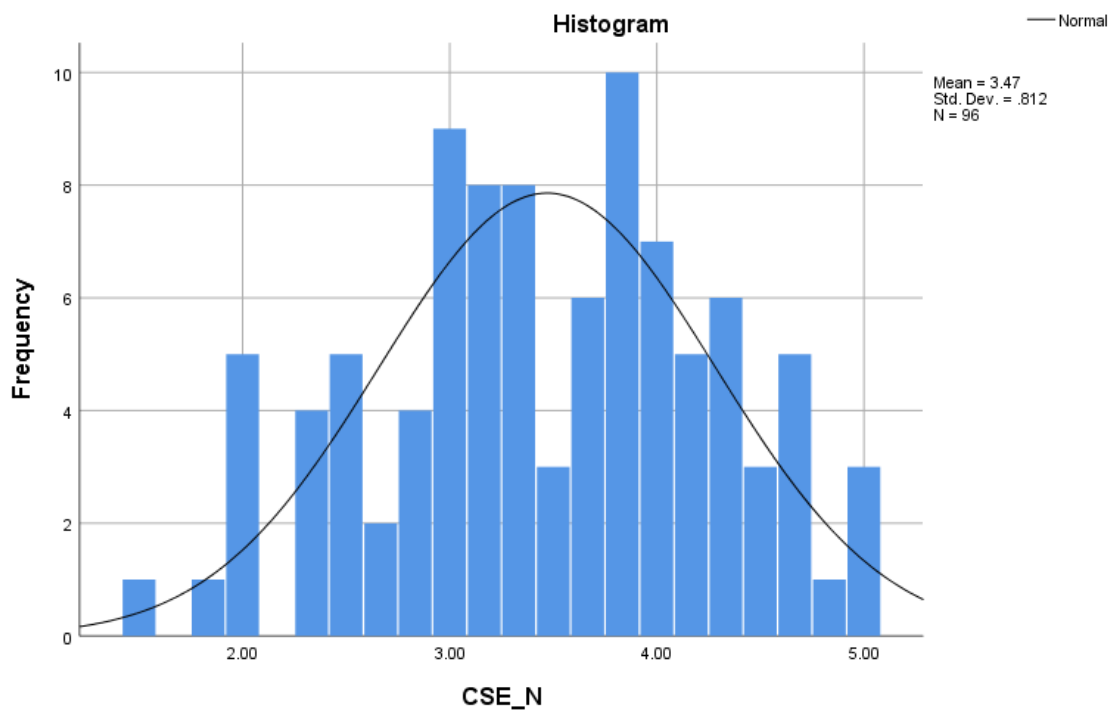
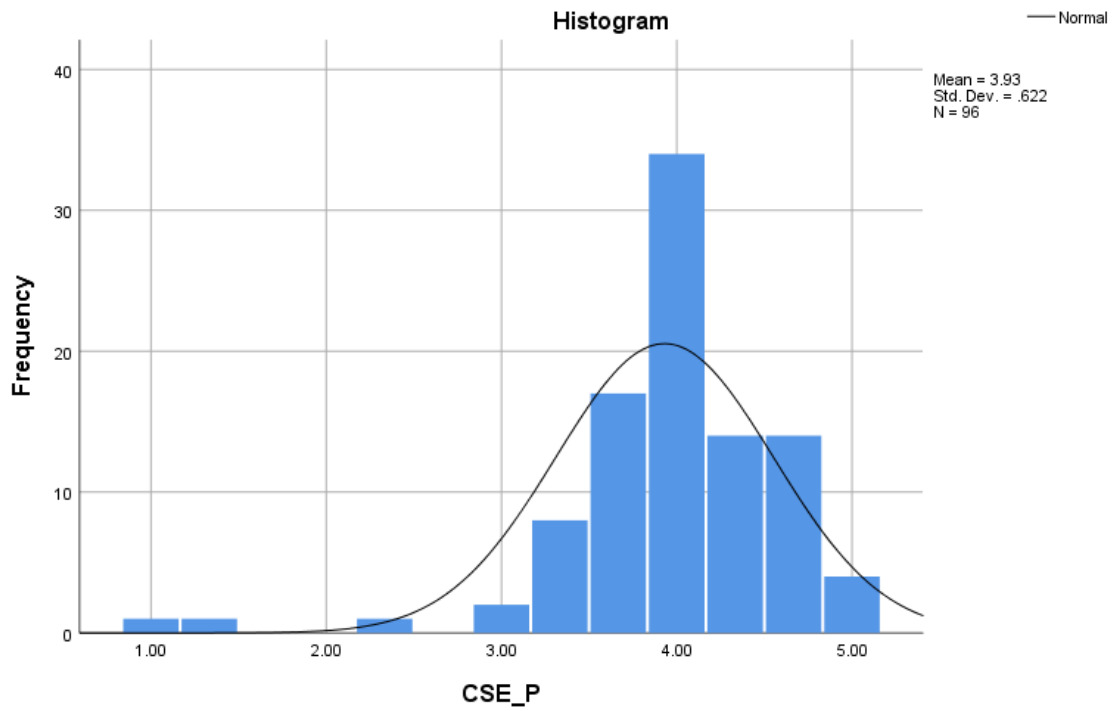






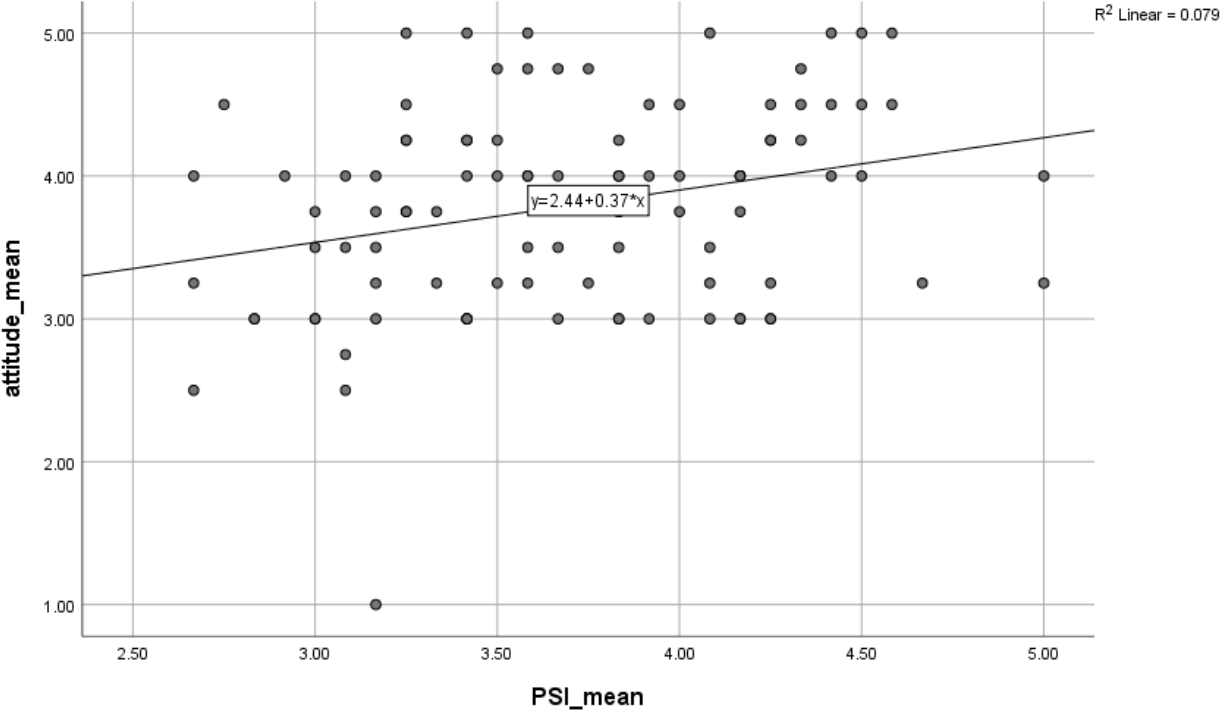


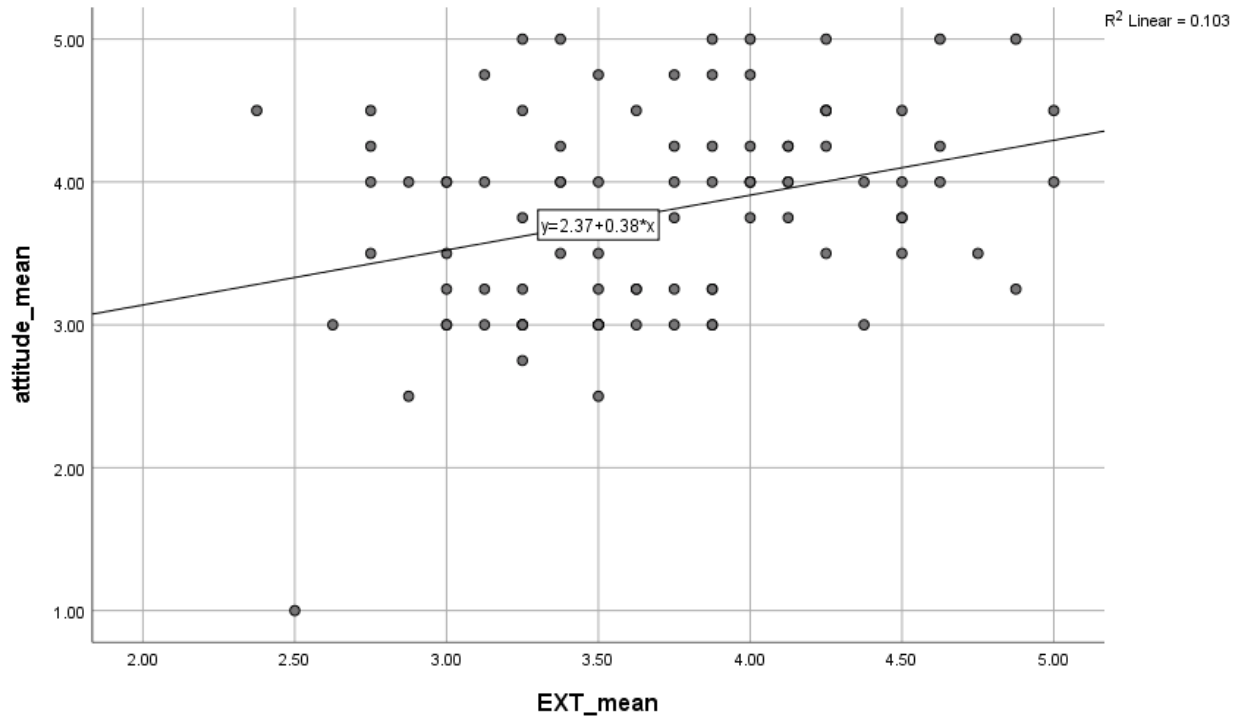


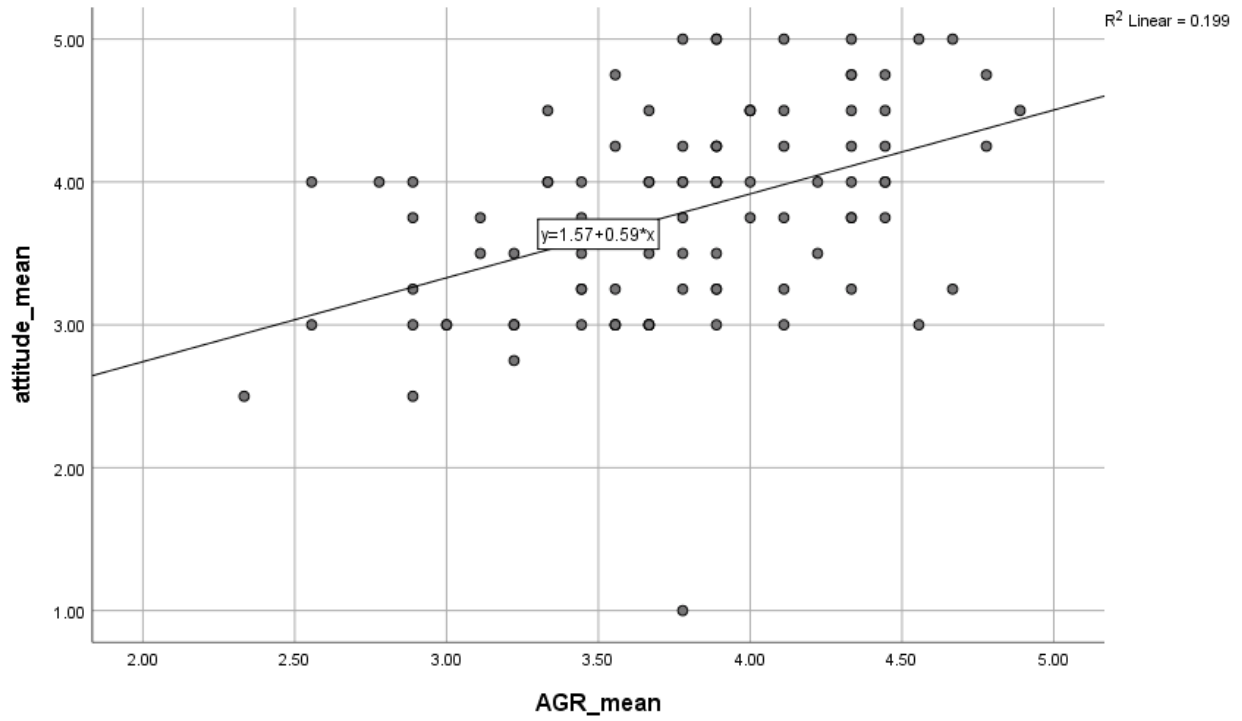


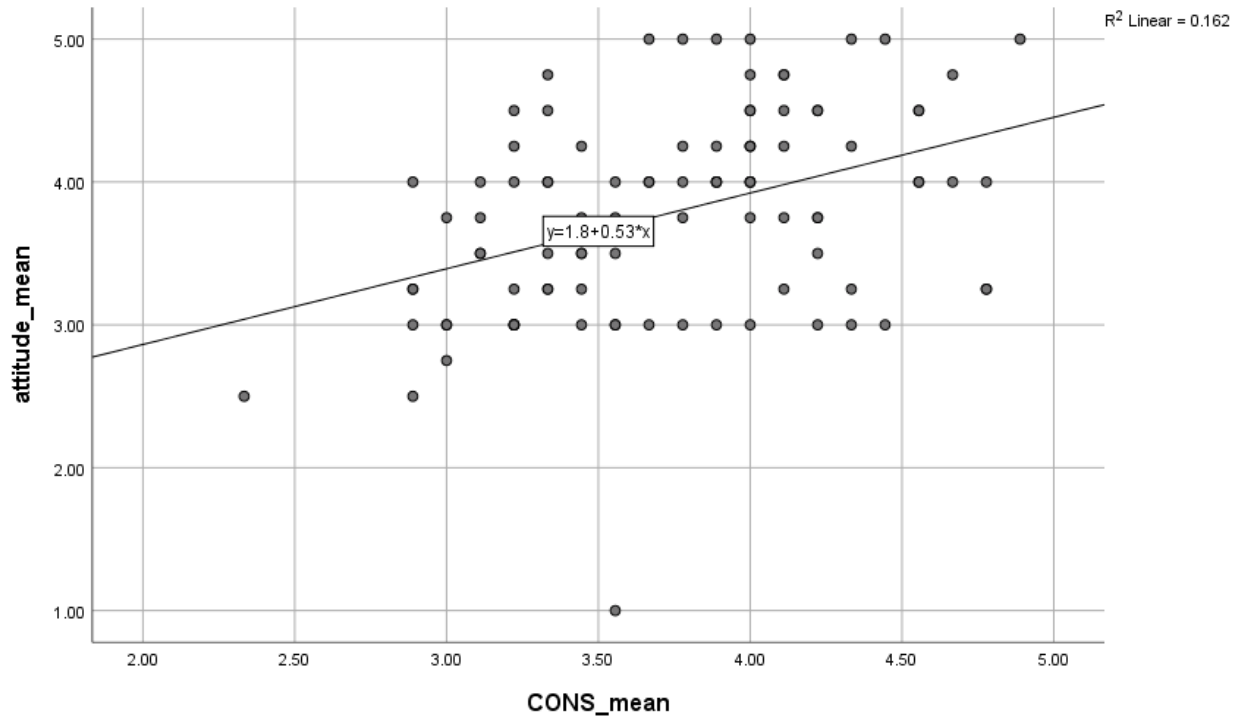
Appendix K: Regression Assumptions (Study 3)

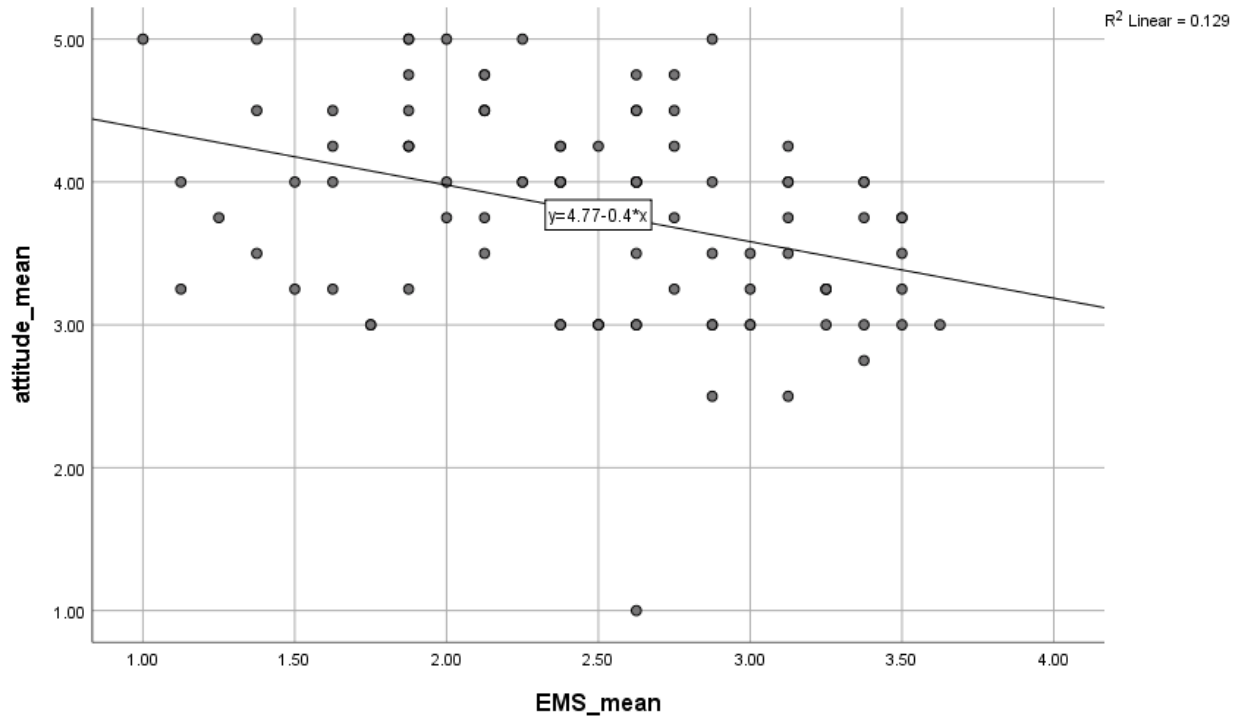
Assumption 1: Linear Relationship between IVs and DV

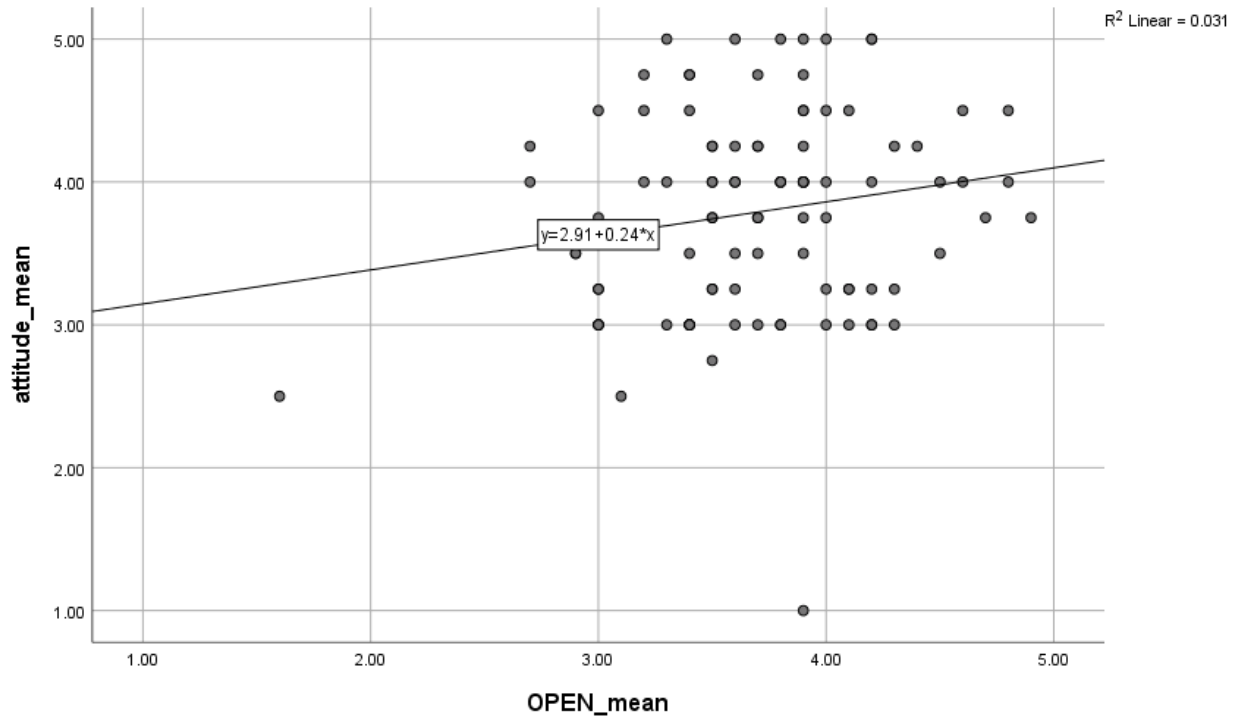


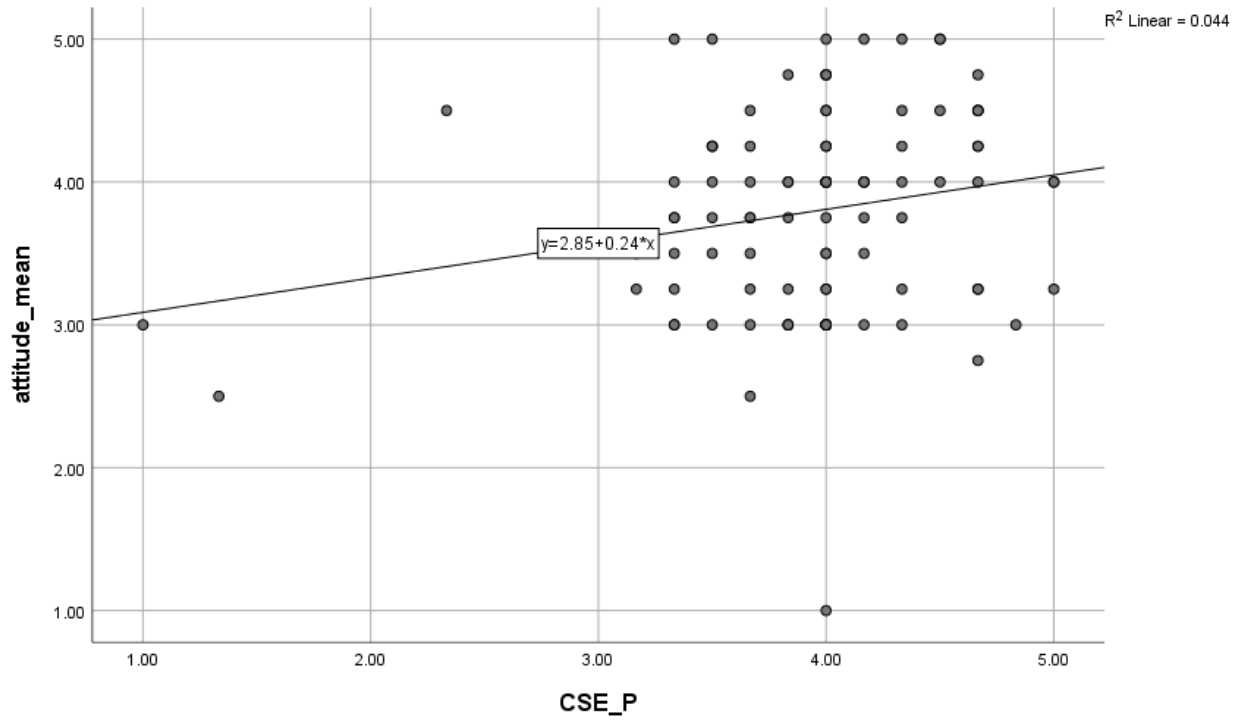


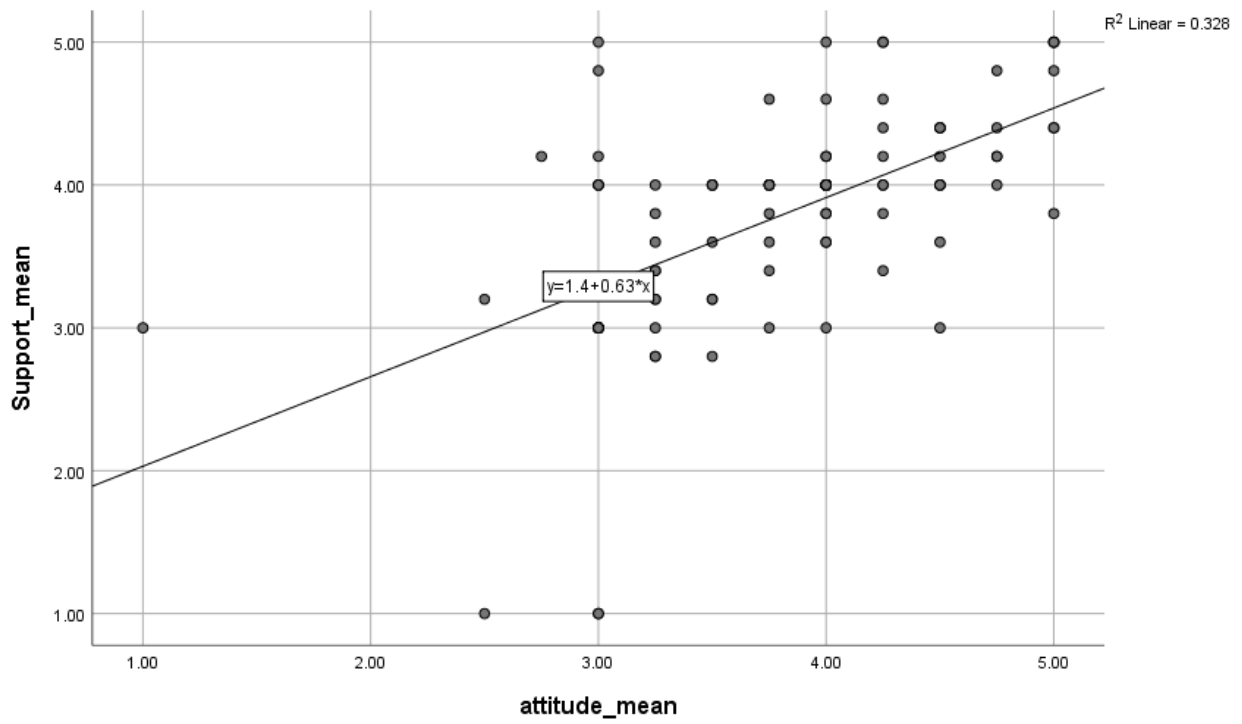
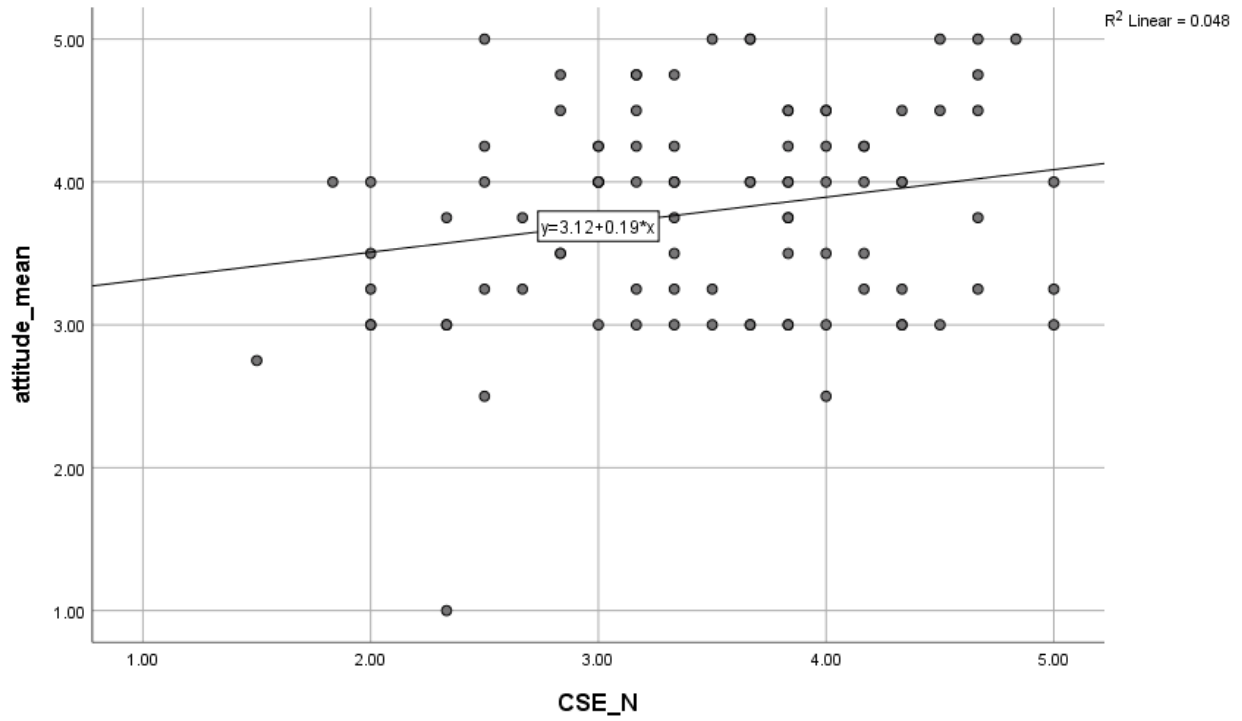






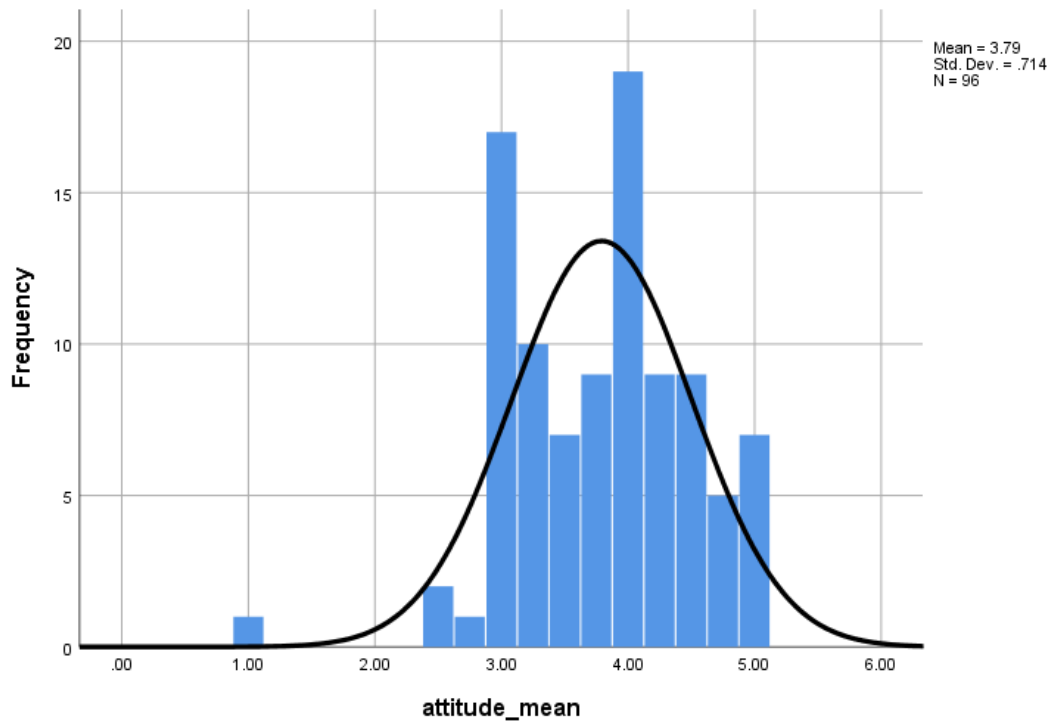
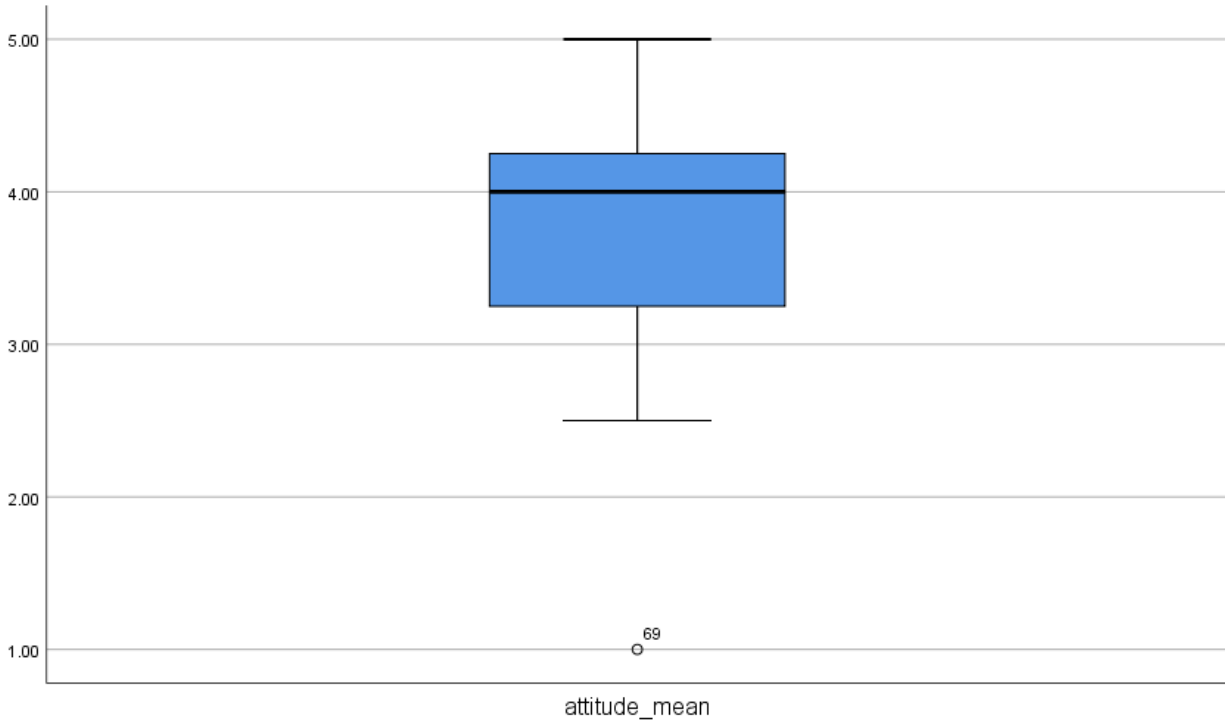




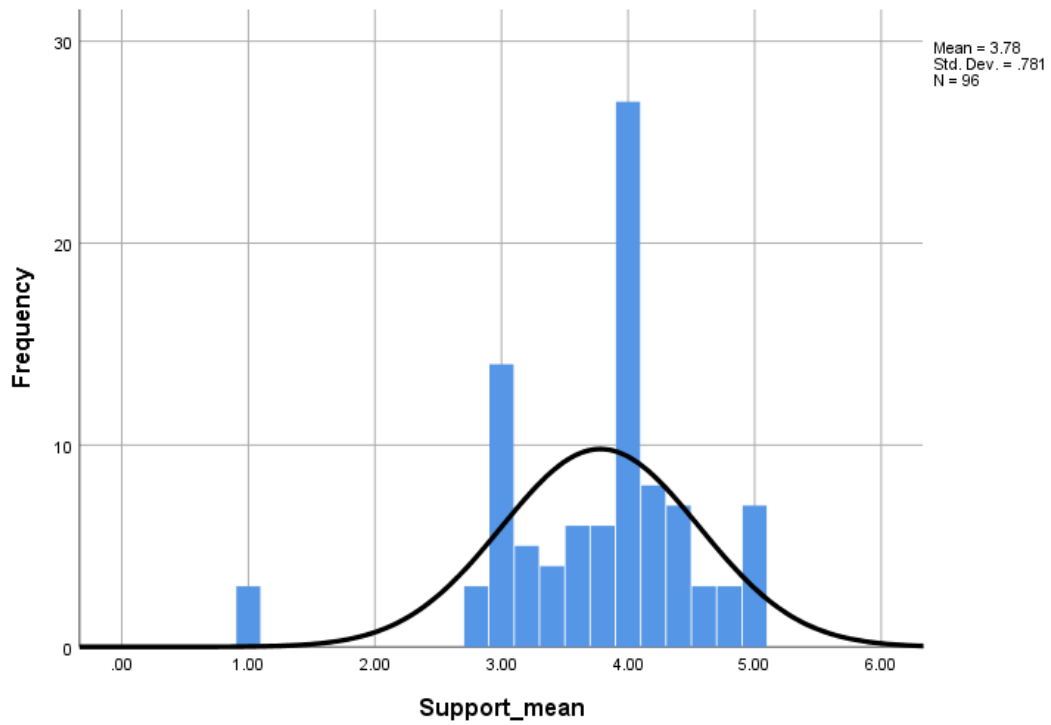
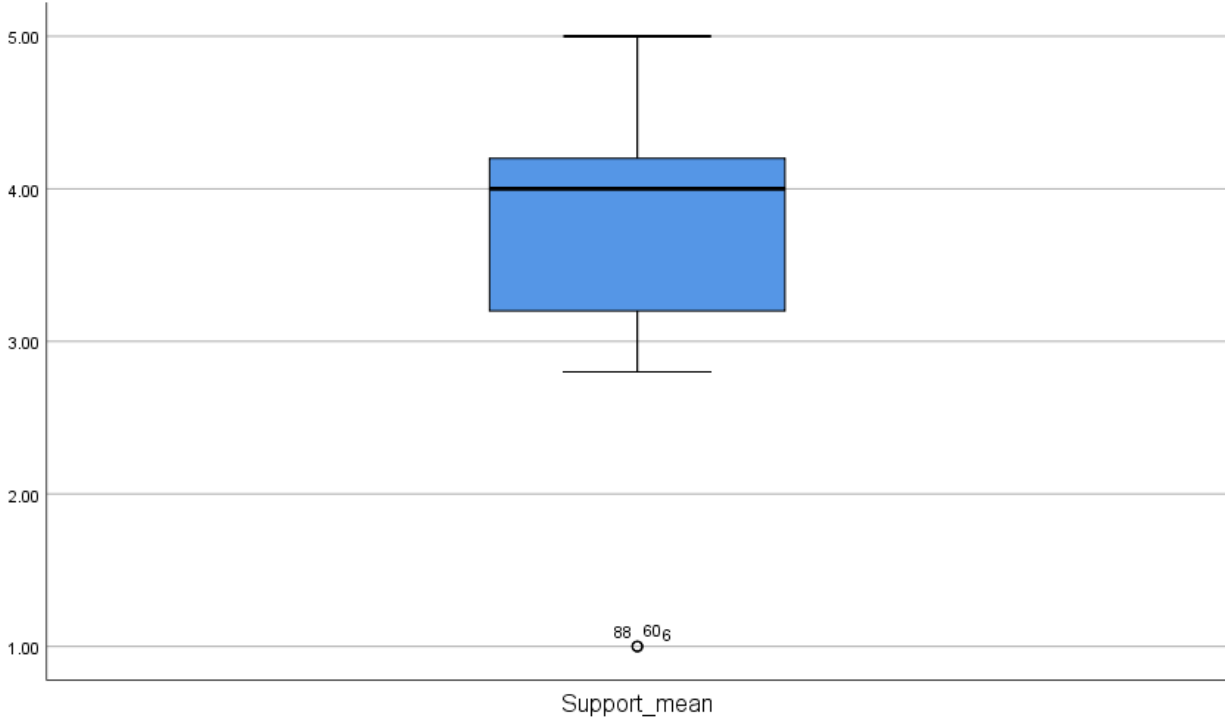


Assumption 2: . Absence of outliers

Using a box-plot, supplemented by a histogram, to identify outliers in the DV. Data point 69 is an outlier.



Data point 88, 66, and 6 are outliers.



Assumption 3: Absence of multicollinearity

Use correlations between the independent variables, None of the correlations are strong and significant

		Correlations							
		EXT_mean	AGR_mean	CONS_mean	EMS_mean	OPEN_mean	CSE_P	CSE_N	PSI_mean
EXT_mean	Pearson Correlation	1	.369**	.265**	-.474**	.429**	.331**	.369**	.461**
	Sig. (2-tailed)		.000	.009	.000	.000	.001	.000	.000
	N	96	96	96	96	96	96	96	96
AGR_mean	Pearson Correlation	.369**	1	.652**	-.593**	.259*	.295**	.325**	.408**
	Sig. (2-tailed)	.000		.000	.000	.011	.004	.001	.000
	N	96	96	96	96	96	96	96	96
CONS_mean	Pearson Correlation	.265**	.652**	1	-.537**	.230*	.377**	.438**	.539**
	Sig. (2-tailed)	.009	.000		.000	.024	.000	.000	.000
	N	96	96	96	96	96	96	96	96
EMS_mean	Pearson Correlation	-.474**	-.593**	-.537**	1	-.224*	-.401**	-.667**	-.722**
	Sig. (2-tailed)	.000	.000	.000		.028	.000	.000	.000
	N	96	96	96	96	96	96	96	96
OPEN_mean	Pearson Correlation	.429**	.259*	.230*	-.224*	1	.310**	.143	.282**
	Sig. (2-tailed)	.000	.011	.024	.028		.002	.165	.005
	N	96	96	96	96	96	96	96	96
CSE_P	Pearson Correlation	.331**	.295**	.377**	-.401**	.310**	1	.153	.681**
	Sig. (2-tailed)	.001	.004	.000	.000	.002		.137	.000
	N	96	96	96	96	96	96	96	96
CSE_N	Pearson Correlation	.369**	.325**	.438**	-.667**	.143	.153	1	.828**
	Sig. (2-tailed)	.000	.001	.000	.000	.165	.137		.000
	N	96	96	96	96	96	96	96	96

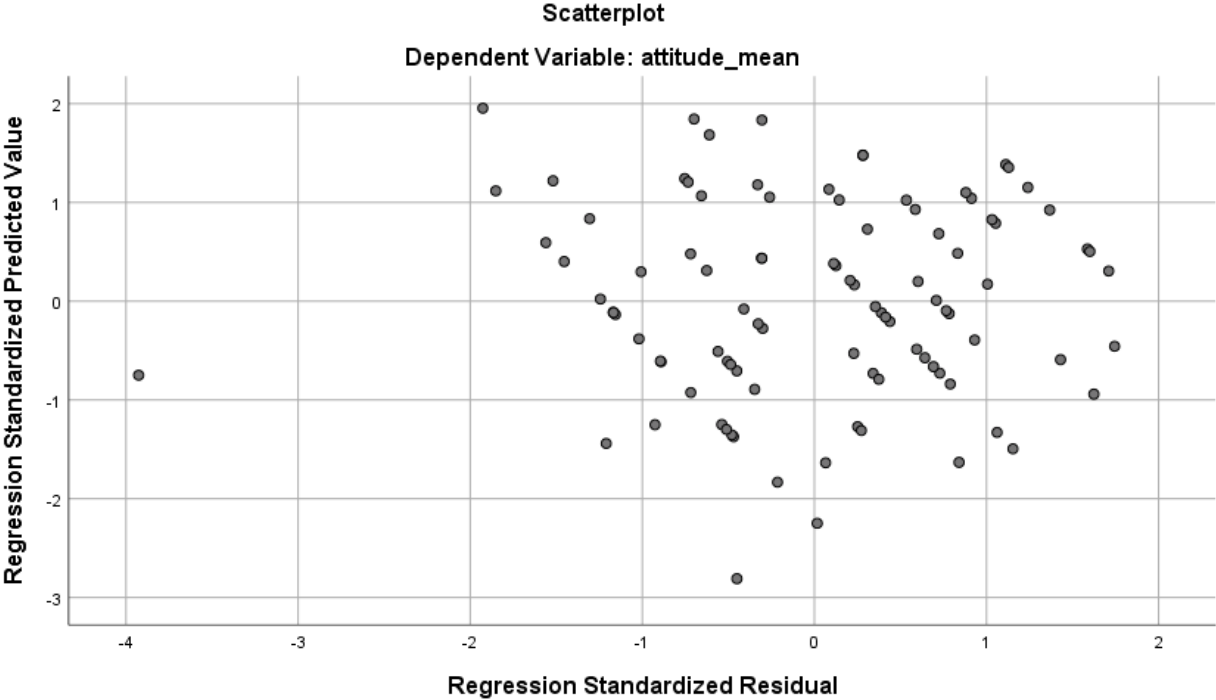
PSI_mean	Pearson Correlation	.461**	.408**	.539**	-.722**	.282**	.681**	.828**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.005	.000	.000	
	N	96	96	96	96	96	96	96	96

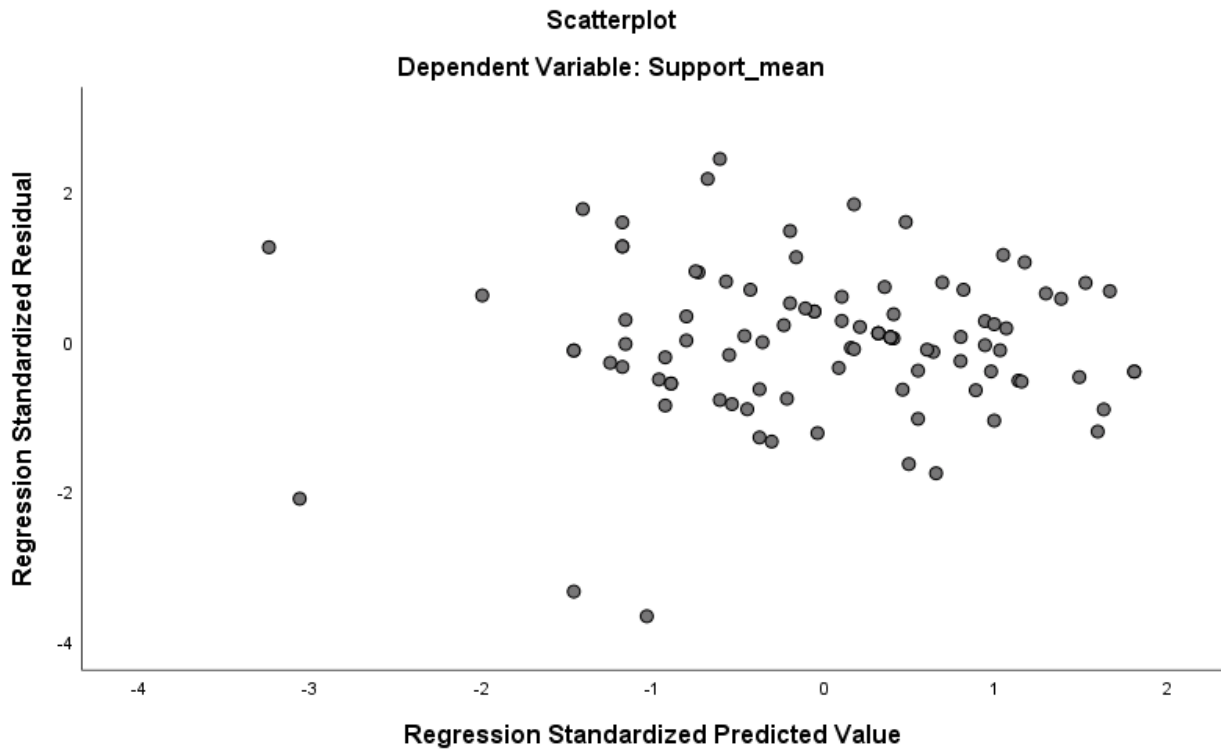
** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Assumption 4: Homoscedasticity

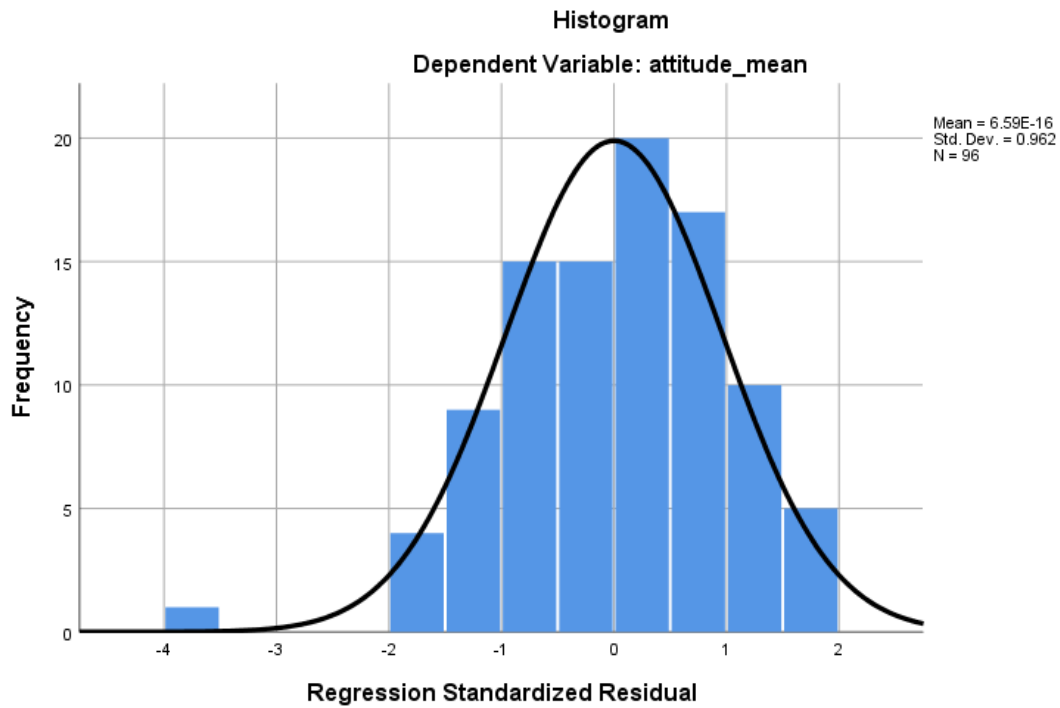
Variances along the line of best fit remain similar along the line



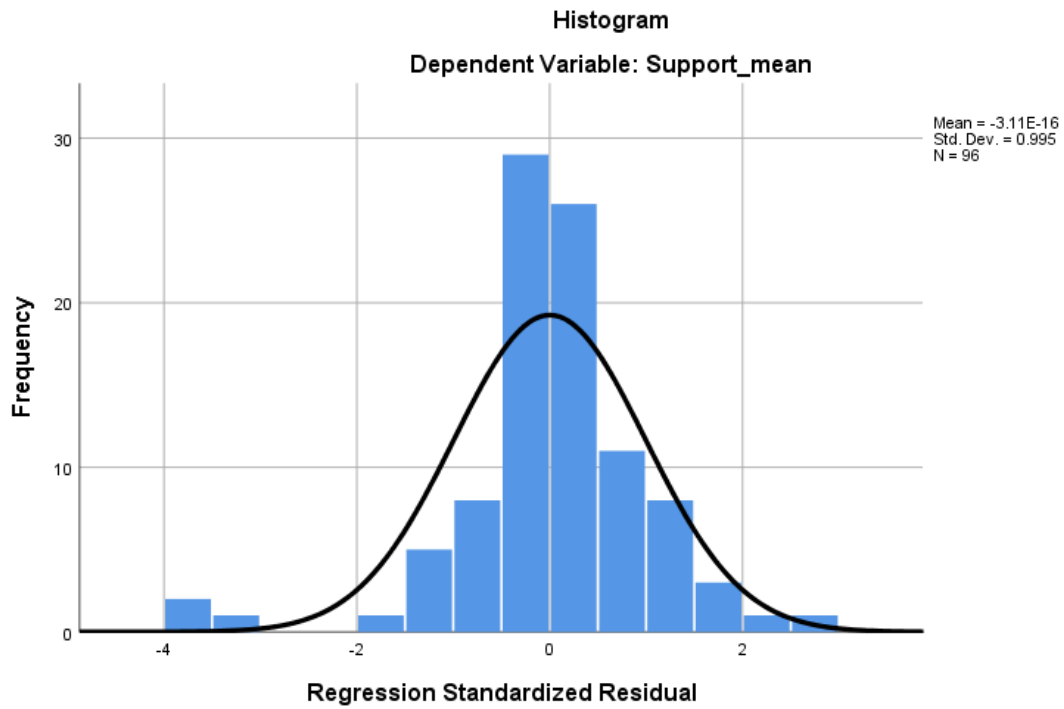


Assumption 5: Residuals are normally distributed

The residuals should be approximately Normally distributed. This is close enough so we can use the results of the regression. All bars should be between -3 and +3 on the x-axis. If some are beyond this, there may have some outliers which need to be checked before continue (see Field (2013)).



Independent variables: PSI; positive self-image; CSE_P: positive aspect of PSI; CES_N: negative aspects of PSI; EXT: Extraversion; AGR: Agreeableness; CONS; Conscientiousness ; EMS: emotional stability; OPEN: Openness to experience; attitude; dependent variable: senior managers' attitude toward MIS implementation



Independent variable: senior managers' attitude toward MIS implementation ; dependent variable: senior managers' support toward MIS implementation

Appendix L: Themes, Sub-themes, and Codes Generated from Interviews (Study 2)

theme	Sub-theme	codes	Participant example
Industries		-Industrial batteries -Food industry	
Job titles		-Product manager -Managing director	
Implementation challenges	Cost	-Expensive consultancy -Costs of the training -Investment in the initial infrastructure	'Consultancy is very expensive and you want to limit the financial burden' [p1]. 'The hidden costs of the training and getting people up to speed is very challenging' [p5].
	Staff challenges	-Training quite confusing -Employees resentment -Having to re-learn new things	'I think we actually found the training quite confusing' [p4]. 'The employees resent it thinking that they got to lose their jobs [P2]. 'People, of course with tonnes and tonnes of years of experience having to re-learn new things and sometimes having the time to do that is really important' [P3].
	Organisational challenges	-Difficult to implement operationally in an effective way	'It's difficult to implement operationally in an effective way and because of that complexity' [P4].

theme	Sub-theme	codes	Participant example
		<ul style="list-style-type: none"> -Cultural change -Company doesn't have the functions in place that are necessary 	'It's a cultural change within a business for a lot of people' [P5].
	General challenges	<ul style="list-style-type: none"> -Time consuming -Not very flexible 	'It takes time' [P12].
	Pre-implementation challenges	<ul style="list-style-type: none"> -Proper implementation plan -Setting expectations -Scope of the project 	<p>'Having a proper implementation plan is critical' [P1].</p> <p>'The main issue that I understand in implementation like this, is setting expectations because both you and the customer, but primarily the customer, doesn't really understand what he's getting into it' [P6].</p>
	Post-implementation challenges	<ul style="list-style-type: none"> -Upgrade the system -New ways of working -Not making any decisions from that data -It takes a long time and effort to see the benefit 	<p>'Have to upgrade the system to a more complex manufacturing system' [P9].</p> <p>'He challenge often requires new skills, new attitudes, new ways of working, often new ways of collaborating across the business' [P12].</p>

theme	Sub-theme	codes	Participant example
data	Difficulties/issues	<ul style="list-style-type: none"> - Availability of data and information - Ability to measure things very often is not in place -Bad data/not reliable -Data interpretation -Data migration 	<p>'Data and the ability to measure things very often is not in place and then what you have to do is set up new methods and approaches' [P12].</p> <p>'The problem is the underlying data on ours is not good for that to be reliable' [P11].</p>
	Advantages	<ul style="list-style-type: none"> -Have all of that information in one place -Clarity of the data -Accuracy -Less chance for error 	<p>'Put everything under one umbrella' [P6].</p> <p>'You're all working off the latest information to do with a customer or a product and it means that there's less chance for error' [P3].</p>
Benefits	General benefits	<ul style="list-style-type: none"> -Track the decisions -Efficiency -More control over the process -Paperwork process is actually automated -Growing business 	<p>'Which allows us to keep track of productivity, efficiency and stock control and things like that' [P9].</p> <p>'The benefits are it offers more control over the process' [P8].</p>

theme	Sub-theme	codes	Participant example
	Customer benefits	-Helps build that relationship with customers -Having access to all the functional parts of a business relationship	'I think it's very good for base data having access to all the functional parts of a business relationship' [P3].
	Financial benefits	-Saving money -Understanding budgets	'Understanding budgets, profit and cost centers the standard profit and loss balance sheet' [P6].
Decision making process to implement MIS	Factors to choose from different MIS	-Cost -Usability -Competitors	'So three of us within the senior leadership team would test the software and compare notes on it. We'd look at competitors. So, I'd say cost, usability and probably competition. When I say competition I also mean, what's the industry standard so what are others using and in the space' [P4].
	Reasons to implement	-Being familiar with the system -External knowledge -Benefits would outweigh the challenge	'We started with QuickBooks because I was familiar with that coming from the States' [P9]. 'One of our directors read this in a textbook or at some kind of seminar or something and then decided we should do it' [P11].
Reasons to upgrade		-Faulty -Did not provide or have abilities needed to manage and run the business effectively.	'I think upgrading to new systems if the existing system is faulty you need to upgrade' [P12].

theme	Sub-theme	codes	Participant example
		<ul style="list-style-type: none"> -Background updates and software updates to make the system more efficient -Got to adapt and change when we see those benefits 	'It's nice to keep the package view the same, but background updates and software updates to make the system more efficient that's pretty good' [P5].
Contributing factors to successful implementation		<ul style="list-style-type: none"> -They become centre of that implementation -Cultural change 	'It's really important that people share what's going on when they're trying to put the new system' [P3].
Supporting factors in implementation		<ul style="list-style-type: none"> -Support from analysts -HR organisation -Leadership team -External consultancy -Technical Support from the supplier -Colleagues who had a lot more knowledge 	'We went through various workshops, facilitated from the external consultancy that we're implementing it' [P11].
Consequences of badly implemented system	Human perspective	<ul style="list-style-type: none"> -Decline in performance -Burn outs. -It can destroy people's lives, -Produce anxiety. -A huge correlation with how we define ourselves and how we define success in so many ways. 	'Could be incredibly damaging for people's morale' [P12].

theme	Sub-theme	codes	Participant example
	Business perspective	<ul style="list-style-type: none"> -Not well calibrated to the specific situation of a business -A big interconnection between strategy and execution -There's a really strong correlation between poor management quality and poor management systems -Measures no lacking and outcome indicators. 	'Definition of success is not allowed or agreed across the team in a company' [P12].
Education profile	Academic background	<ul style="list-style-type: none"> -MIS actively being taught, and rightly so -A better understanding of the holistic approach 	<p>'Academic education to brings some sort of process oriented mindset and approach' [P10].</p> <p>'Academic education teaches you how to manage an extreme number of variables' [P9].</p>
	Vocational background	<ul style="list-style-type: none"> -Professional qualifications -In the field 	'I 'm not sure that's directly linked to my education, but it's gone as systems thinking and being able to conceptualise those kind of skill sets' [P11].
Personality traits			

theme	Sub-theme	codes	Participant example
	Self-worth	-Be relied on -A good manager	'Somebody who delivers, so somebody who can be relied on to do something to get something done. Somebody who's very passionate' [P4].
	Emotional stability	-More driven by emotion -Quite intense	'It also means that you're more driven by emotion and feeling rather than process and rational reflection so that's what I would call it' [P4].
	Self-efficacy	-Ensure I reach my goal -I fight for them	'I know what I want to achieve and I'm taking the steps or the necessary steps to ensure I reach my goal so it's a personal individual goal' [P8].
	Locus of control	-Things just do go wrong -Have to wow the customer	I take these things we try to do very seriously and there's things that always sneak in, that go wrong. There are many things that can fail when you do anything. And a lot of times that's a reality of life that things just do go wrong and things don't work out exactly as you expect, etc. That's the way life is. But that doesn't mean that we shouldn't adopt and fix it and make it right. We shouldn't wait until next week to do it. We should do it now. I think that's what I mean when I say I have an intense focus on making sure things work as they should [P12].
	Positive characteristics	-Dependable -Inspirational -Open -Honest -Knowledgeable	'I think they see me as dependable and inspirational' [P9]. 'Good source of information' [P1].

theme	Sub-theme	codes	Participant example
	Negative characteristics	Impatience -intense	'There could be periods where I'm intense. I work with a sense of urgency around what I do' [P12].
	supportive	-Empowers -Encourages	'I like to convey myself as somebody that empowers and enables my staff so I'll encourage them and guide them how to solve a problem.' P.1
	Drivenness	-Goal oriented -Ambitious	'If I have a goal and I want to achieve something I don't like, not to achieve it' [P12].
	sociability	-Feel comfortable coming to me -Know everybody	'I'm probably one of the only people in the room that actually knows everybody else in the room or the vast majority of people' [P11].
	Open minded	-Open to new ideas -Evolving person to my environment	'Keen on changing or implementing changes in order to improve the business and achieve its objectives' [P8].
	Creative	-Madman -Full of ideas	'Talk to them about is all about creating new ideas, crazy things that we can do' [P9].
	Ethically minded	-Fundamentally ethically wrong -Caring for environment	'How much an impact on the planet are we now doing' [P2].
Interpersonal relationships	Straightforwardness	-A fairly blunt -Direct person	'By nature, I am a fairly blunt and direct person' [P7].

theme	Sub-theme	codes	Participant example
	Compliance	-Willing to take on conflicts and solve them -Caring -Good communicator -Team player	'Very willing to establish clarity even in topics that are normally difficult to discuss' [P12] 'Communicating with them in the correct way' [P5].
Leadership style	Democratic	-Bring people along -Hate micromanaging	'Very happy in stepping aside and letting people do things' [P12]. 'More incorporating ideas and opinions from all sorts of parties within the team, and make sure that they're all engaged in the decision making process' [P10].
	Authoritative	-Commanding -To be the captain of the ship	'Make people do stuff, give out a lot of actions and then walk away and that can annoy people' [P11].

Appendix M: Correlation Analysis (Study 3)

		Correlations						
		EXT_mean	attitude_mean	AGR_mean	CONS_mean	EMS_mean	OPEN_mean	PSI_mean
EXT_mean	Pearson Correlation	1	.321**	.369**	.265**	-.474**	.429**	.461**
	Sig. (2-tailed)		.001	.000	.009	.000	.000	.000
	N	96	96	96	96	96	96	96
attitude_mean	Pearson Correlation	.321**	1	.446**	.402**	-.359**	.176	.281**
	Sig. (2-tailed)	.001		.000	.000	.000	.087	.006
	N	96	96	96	96	96	96	96
AGR_mean	Pearson Correlation	.369**	.446**	1	.652**	-.593**	.259*	.408**
	Sig. (2-tailed)	.000	.000		.000	.000	.011	.000
	N	96	96	96	96	96	96	96
CONS_mean	Pearson Correlation	.265**	.402**	.652**	1	-.537**	.230*	.539**
	Sig. (2-tailed)	.009	.000	.000		.000	.024	.000
	N	96	96	96	96	96	96	96
EMS_mean	Pearson Correlation	-.474**	-.359**	-.593**	-.537**	1	-.224*	-.722**
	Sig. (2-tailed)	.000	.000	.000	.000		.028	.000
	N	96	96	96	96	96	96	96
OPEN_mean	Pearson Correlation	.429**	.176	.259*	.230*	-.224*	1	.282**
	Sig. (2-tailed)	.000	.087	.011	.024	.028		.005
	N	96	96	96	96	96	96	96
PSI_mean	Pearson Correlation	.461**	.281**	.408**	.539**	-.722**	.282**	1
	Sig. (2-tailed)	.000	.006	.000	.000	.000	.005	
	N	96	96	96	96	96	96	96

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Appendix L: Interview Protocol (Study 2)

Participant information

This information will be anonymous

1-What is your gender?

Male Female Non-binary

2-What is your age?

18-24

25-34

35-44

45-54

55-64

65+

3-What is your highest level of education?

No formal qualification

Diploma

College degree

University first degree

Master's degree or higher

4-What is your current position in this company?

CEO

CFO

Senior management

Junior management

5-how long you have been working in this position for?

Less than 1 year

1-2 years

3-5 years

6-9 years

10-14 years

15+ years

6-Where is your company located?

Scotland

Wales

Northern Ireland

England

7-What is the nature of your business?

Manufacture of food products

Manufacture of beverages

Manufacture of tobacco product

Manufacture of textiles

Manufacture of wearing apparel

Manufacture of leather and related products

Manufacture of wood and of products of wood and cork; except furniture; manufacture of articles of straw and plaiting

Manufacture of paper and paper products

Manufacture of coke and refined petroleum products

Manufacture of chemicals and chemical products

Manufacture of basic pharmaceutical products and pharmaceutical preparations

Manufacture of rubber and plastic products

Manufacture of other non-metallic mineral products

Manufacture of basic metals

Manufacture of fabricated metal products; except machinery and equipment

Manufacture of computer; electronic and optical products

Manufacture of electrical equipment

Manufacture of machinery and equipment n.e.c.

Manufacture of motor vehicles; trailers and semi-trailers

Manufacture of other transport equipment

Manufacture of furniture

Other manufacturing

8-How old is your company?

less than 5 years

5-10 years

10+

9-How many employees does your company have?

1-4

5-49

50-249

250-1,000

1001-5,000

5,001-10,000

10,000+

10-What is annual turnover of your company?

Less than £500k

£500-£999k

£1m-£5m

£6 - £10

£11 - £15

£16 - £25

More than £25m

Thank you for taking time to take part in this interview

Could you please indicate what was your career path? (what kind of roles, organisations, industry they worked in? (career variety)

1. as part of your job roles in the past and your current role, have you ever worked with making decision about implementing information systems projects in the past?
2. now we've been talking about IS, have you ever got involved in implementing management information systems i.e., ERP, SRM and CRM?

[if NO] don't worry about if you don't know about these systems, I m going to give you a brief definition/description of these system because I am still interested in finding out about what your perspective/views would be on these systems

[if YES] thank you for letting me know, could you please expand for me how long you've been working with these systems? What were your experiences while working with these systems? (Involvement with IS and specific system)

3. based on your experience of working with those systems, could you please tell me the values and challenges of implementing these systems? (attitude toward MIS implementation)

[if they haven't worked with these systems} don't worry if you haven't worked with these systems, what do you think it will be the values and challenges of these systems?

4. in your opinion, do you think your education background has helped you to identify the benefits and challenges of those systems?

5. What kind of support did you have, when working with these systems?

[if they haven't worked with the system] If you implement these systems, what sort of support do you think you'll require?

6. Now you have identified some of the benefits and challenges of working with these systems, what are your thoughts in terms of implementing these systems within your organisation? (support toward MIS implementation)

if they have already implemented] now you've already implemented/worked the system in your organisation, what do you think about the employment longevity? (would you upgrade to new systems?)

7. Research has shown that there is a link between a manager's self-image and their attitude toward MIS implementation. I am going to ask you about self-image, I mean how you perceive yourself and how others perceive you (an easy definition of PSI)
How would you describe yourself in your role as a senior manager? (self-perception)

8. How do you think your colleagues perceive you as a manager?(Natanzon *et al.*, 2010) (social self-image)

Thank you for taking part in this interview

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