THE SUPPLY SIDE OF INNOVATION DIFFUSION-A UK SME BROADBAND ADOPTION PERSPECTIVE

Oluwasola Oni, School of Information Systems, Computing & Mathematics, Brunel University, UK

oluwasola.oni@brunel.ac.uk

Anastasia Papazafeiropoulou, School of Information Systems, Computing & Mathematics, Brunel University, UK

anastasia.papazafeiropoulou@brunel.ac.uk

Abstract

Recent research suggests that the majority of the Small and medium sized enterprises (SMEs) e-business research focusses primarily on studying innovation diffusion within the SMEs themselves with limited research into the supply-side of innovation diffusion This study examines the supply side of innovation diffusion to SMEs in south east United Kingdom (UK). It aims to examine and provide an indepth view of the broadband diffusion process to SMEs in UK by exploring the views and activities of the various groups involved in the process with a particular focus on the supply side. Innovation diffusion and social construction of technology theory are applied to extend a framework with a view to address some of the issues not covered in previous literature. Our research results suggest that even though the various social groups are working towards the same goal, both sides have a very different view of what the expectations are from the supply side of innovation diffusion. We believe that our results are useful to providers looking to diffuse broadband as well as other IT innovations to SMEs.

Keywords: Broadband, SMEs, Innovation Diffusion, SCOT.

1   INTRODUCTION

Governments of different countries see broadband as vital for achieving ecommerce goals and providing social and economic benefits to their citizens (ITU, 2003 and OECD, 2003). There are some government initiatives aimed at improving broadband adoption by SMEs. Fife and Pereira (2002) highlighted the possibility that government subsidies to SMEs are an effective way to increase broadband take-up within this group. Additionally, specific government incentives have been made available such that the price of broadband for SMEs should be less of a constraint to take-up than for households (Affuso and Waverman, 2002). Edinburgh Parallel Computing Centre (EPCC) (2002), similarly, observed that the UK government sees broadband as the "next leap forward for the Internet" and expected SMEs in particular to benefit from the technology. In the UK, in spite of a government push, the adoption of broadband by SMEs was initially slow but although the adoption figures have improved over recent years, there is evidence to show that many SMEs still lag behind. In 2004, according to Ofcom (2004), 68% of UK SMEs were connected to the Internet, of which 37% used broadband, 65% used narrowband, 23% used ISDN, 32% used a narrowband un-metered service, 21% used a narrowband metered service and 6% unsure of what type of narrowband connection they have. In 2006, 77% of SMEs were connected to the Internet while 62% of SMEs used broadband for their Internet connection (Ofcom, 2007). The UK experienced growth in both the number of residential and SME broadband connections but the majority of broadband growth came from residential connections, which increased by 11.4% to 1.6 million during the year, while SME connections increased by 2.9% to 1.4 million and revenues from SME internet services were unchanged in 2008 (Ofcom, 2009).

The European commission (2007) defines Small and medium size enterprises (SMEs) as enterprises with fewer than 250 employees. Micro enterprises are enterprises with fewer than 10 employees while

small enterprises have between 10 and 49 employees with an annual turnover and/or annual balance-sheet total not exceeding 10 million euros. Medium enterprises on the other hand, have fewer than 250 employees with an annual turnover not exceeding 50 million euros or an annual balance-sheet total not exceeding 43 million euros. SMEs represent a significant part of the European economy. They are a major source of entrepreneurial skills, innovation and employment (European commission, 2007). In the European economic area (EEA), SMEs account for 75 million jobs and 99% of all enterprises (European commission, 2007). In the UK in particular, as at 2006, according to the Office for National Statistics (2007) 99.3% of all enterprises in the UK were small enterprises, 0.6% were medium-sized and 0.1% were large. SMEs accounted for 58.9% employment and 51.9% of the sales turnover generated in the country.

In spite of the increasing significance of broadband, many small and medium enterprises (SMEs) are unaware of or unappreciative of its benefits. This is potentially a problem for governments, Internet Service Providers and other supply side institutions (Gholami *et al*, 2009). These are organisations that have an interest and others a vested interest in the SMEs' adoption of broadband. While several benefits have been highlighted by these groups, there are also drawbacks that may not spur SMEs on to adopting broadband. For instance, in the years between 2006 and 2009, the UK SMEs still had problems with the availability, quality, speed, cost and suitability of broadband (Oni and Papazafeiropoulou, 2009; Seemann, 2010). This in turn affects their ability to do business. Furthermore, the current broadband infrastructure is not completely fit for purpose because it was designed for web surfing and light emailing and not for the latest business internet applications (Seamann, 2010).

There have been several research into innovation diffusion and adoption. While Information Systems innovations adoption research in SMEs seems to be still understudied (Ramdani and Kawalek, 2007). According to Parker and Castleman (2007) majority of the SME-eBusiness research focussed primarily on studying the SMEs themselves with limited research into the supply-side of innovation diffusion. Diffusion of innovation studies have typically focussed on the demand side of innovation without a lot of focus on the supply side. This paper therefore aims to consider the supply side with a view to highlighting the roles and possible responsibilities of the players within the supply side of innovation diffusion.

Section 1 provides an introduction and explains the research problem. In section 2, we provide a background literature where background theory is examined and a research framework is extended and applied. Section 3 provides the methodology guiding this research and section 4 examines and provides analysis results which lead us to our discussion in section 5 followed by conclusions, limitations and further research included in section 6.

2 THEORETICAL BACKGROUND

In order to understand and explain how a new technology is adopted many studies have used the theory of diffusion of innovations developed by Everett Rogers. Rogers (2003), defines innovation, as 'an idea, practice or object perceived as new by an individual or other unit of adoption' and diffusion as 'the process by which an innovation is communicated through certain channels over time among members of a social system'. Roger's theory has been used in several studies on the diffusion of technologies (Rajagopal, 2002; Karahanna *et al*, 1999; Kumar and Swaminathan, 2003). There are some aspects of the theory that are pertinent in explaining the rate of adoption of an innovation. These are known as the perceived attributes of an innovation.

Individual perceptions of these attributes can help to predict the rate of adoption of an innovation (Rogers, 2003). The perceived attributes of an innovation that are important in explaining the rate of its adoption include: Relative advantage, compatibility, complexity, trialability and observability (Rogers, 2003). *Relative advantage* in the theory of diffusion of innovations is described as the degree to which an innovation is perceived as being better than the idea it supersedes. The degree of relative advantage is usually expressed in terms of economic profitability, social prestige or other benefits. The nature of the relative advantage would be dependent on the innovation in question (Rogers, 2003).

According to Rogers (2003), diffusion scholars found relative advantage to be one of the best predictors of an innovation's rate of adoption. *Compatibility* is described as the degree to which an innovation is seen as consistent with existing values, past experiences and needs of the potential adopters. The innovation can either be compatible or incompatible with socio-cultural values and beliefs, previously introduced ideas or client needs for the innovation. *Compatibility* is described as the degree to which an innovation is seen as consistent with existing values, past experiences and needs of the potential adopters. The innovation can either be compatible or incompatible with socio-cultural values and beliefs, previously introduced ideas or client needs for the innovation.

This study considers the first three innovation attributes (Agarwal and Prasad, 1998; Crum *et al.*, 1996; Cooper and Zmud, 1990). We apply the information systems diffusion model as presented by the above authors and extended by Oni and Papazafeiropoulou (2009). The model specifies that technical compatibility, technical complexity, which is also termed, perceived ease of use and relative advantage, which is also termed, perceived need are the attributes that best explain adoption behaviour. These three innovation attributes will be used in this study as additionally according to Tornatzky and Klein (1982) only relative advantage, complexity and compatibility have been consistently related to adoption behaviour. Gholami *et al* (2010) suggest that perceived usefulness is a strong predictor of users' continuance intention, followed by satisfaction with broadband usage as a significant but weaker predictor. SMEs in a more competitive business environment and whose key executive possesses greater IT knowledge are more likely to use broadband. While Ramdani *et al* (2009) indicate that firms with a greater perceived relative advantage are predicted to become adopters of enterprise systems.

The innovation diffusion theory implies that businesses would decide to adopt an innovation mainly because of its characteristics, without considering other influences. This view is not likely to present the whole picture (Beynon-Davies and Williams, 2003; Lyytinen and Damsgaard 2001). Lyytinen and Damsgaard (2001) showed in their observations that complex technologies would not necessarily diffuse in a specific order. The theory also seems to lack an understanding of the different views and agendas involved in the diffusion process. According to Woolgar (1996) technical and social factors are closely interconnected. It is therefore necessary to ensure that the social factors involved in technology diffusion are clearly evident in this study. Differing opinions and agendas of various groups involved in the process of the adoption of an innovation are not adequately represented in the innovation diffusion theory (Papazafeiropoulou *et al,* 2005). Theories embracing socio-technical approaches are particularly useful in such a situation where there are different views and opinions to be taken into account. One such approach is the constructivist view. The origin of constructivist approach to technology can be found in the sociology of scientific knowledge (SSK) (McLoughlin, 1999). In social constructions, the nature of technology and what it can do are seen as a product of human interpretation.

Social construction of technology (SCOT) provides a strong antidote to technological determinism. With SCOT, the development of a technological artefact is described as alternating between variation and selection; thereby resulting in a multidirectional model that contrasts linear models (Pinch and Bijker, 1987). The authors outline four components to the social construction of technology. They are: relevant social groups, interpretive flexibility, closure, and stabilization.

Relevant social groups: all members of a certain group who share the same set of meanings attached to a specific artefact

Interpretive flexibility: this is the idea that different social groups can have different meanings about the same technological artefact. Not only is there flexibility in how people think of or interpret artefacts but also that there is flexibility in how artefacts are designed.

Closure and Stabilization: closure occurs when a consensus emerges that a problem arising during the development of a technology has been solved. When social groups involved in designing and using technology decide that a problem is solved, they stabilise the technology, the result of which is closure. However, the authors clarify that closure and stabilization are not isolated events but occur repeatedly during development of the technology. Various groups will decide differently not just about

the definition of the problem but also about when closure and stabilization is achieved (Bijker *et al*, 1987). Additionally the concept of a technological frame is also included in the theory. This concept refers to the ways in which relevant social groups attribute various meanings to an artefact.

In SCOT where the introduction of an innovation is faced with objections from different social groups, one seeks to find a solution that would make the innovation desirable for reasons that would supersede reasons for objections. The point of SCOT is that the successful stages in the development of an artefact are not the only possible ones.

Steps involved in SCOT include:
- Identifying the relevant social groups
- Describing them in more detail
- Identifying the problems each of these groups has with respect to the artifact
- Around each of these problems, several variants of the solution can be identified.

This way of describing the developmental process brings out all the different kinds of conflicts. This model highlights the multidirectional character of a technological artefact. The interpretative flexibility of an artefact must be shown. This sort of perspective allows researchers to examine the way specific users shape technology. In this case, the technological artefact is broadband and there are different social groups (SMEs inclusive) involved in its diffusion. The relevant social groups in this instance include the SMEs themselves, the UK government, and the vendors. This study therefore merges the innovation attributes with elements from SCOT including, social groups, interpretive flexibility and technological frames. Steps involved in SCOT include: identifying the relevant social groups; describing them in more detail; identifying the problems each of these groups has with respect to the artefact and identifying several variants of the solution around each of these problems.
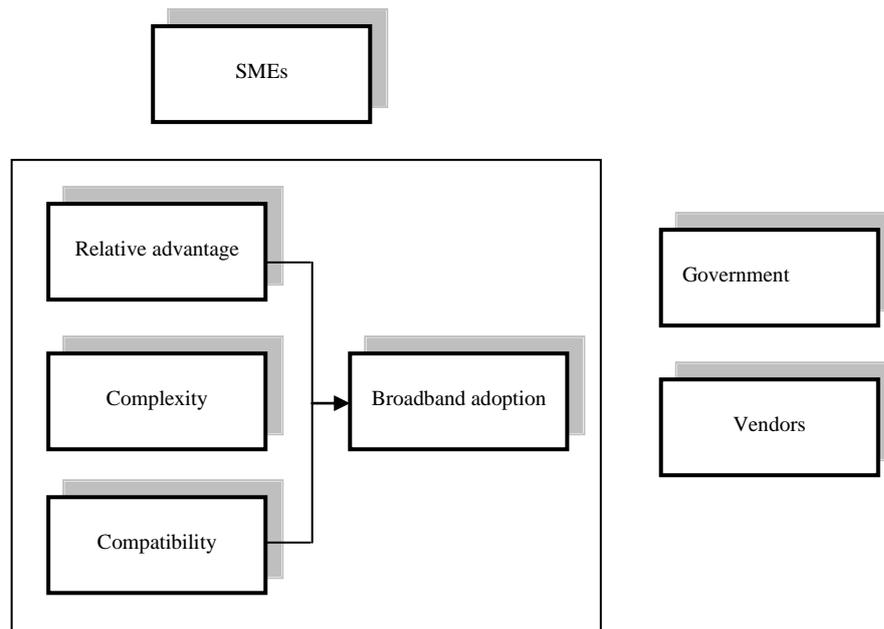
Figure 1. Social groups with an emphasis on the supply side

3   RESEARCH METHODOLOGY

There are several research methods that have been used in the study of information systems. Thus the decision to use a specific approach is not an easy one to make. However, based on the issues discussed in the previous sections of this research, the interpretive research approach within a qualitative methodology has been selected as the most appropriate for this research. This is due to the fact that

this study is exploratory in nature and this approach will be used to understand emerging phenomena within their context. Interpretive research has been used in areas of information systems (IS) research such as, systems design, organizational intervention and management of IS and social implications of IS (Walsham, 1995). Furthermore, according to Klein and Myers (1999) interpretive research can help IS researchers to understand human thought and action in social and organizational contexts.

Interpretive research does not predefine dependent and independent variables, but focuses on the complexity of human sense making as the situation emerges (Kaplan and Maxwell 1994). The interpretive research approach in IS research is "aimed at producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by the context" (Walsham 1993, pp4-5). This method of research adopts the stance that our knowledge of reality is asocial construction by human actors (Walsham, 1995). According to Galliers and Land (1987), research methods must take account of the nature of the subject matter and the complexity of the real world. A major reason for selecting the interpretive research approach is the fact that there are lots of social, political and cultural issues related to broadband diffusion to SMEs. The study of broadband diffusion to small companies cannot be separated easily from its organisational and cultural context. Furthermore, the researcher in this study interacts closely with the human subjects of the enquiry, making the separation between facts and values impossible which in effect changes the perception of both parties (Walsham, 1995). Additionally, considering the social groups that were identified in the previous section, this research attempts to understand phenomena through meanings that those groups assign to them (Walsham, 1993, pp4-5).

Various methods of data collection under the qualitative research approach were used such as interviews, observations and document review. The interviews were based on a semi-structured guide. They were tape-recorded and additional notes were taken by the researchers. The researchers sought the views of two social groups namely, one vendor and two government development agencies. Their views were sought through interviews that lasted between ninety minutes and two hours. The interviews were based on a semi-structured guide. The interviews were tape-recorded and additional notes were taken by the researcher. Subsequently, telephone calls were made and emails were sent and received to clarify arising issues and to validate results. The researchers in this study explored a few general topics to help uncover the social groups' views and respected the way the interviewees framed and structured their responses. This allowed the views of the social groups on broadband adoption by SMEs to unfold as they viewed it and not as the researcher viewed it (Marshall and Rossman, 2006).The resulting data was then analysed using thematic analysis with the aid of SCOT notions including technological frames and interpretive flexibility.

Validity in qualitative research has to do with the description and explanation and whether or not a given explanation fits a given description (Janesick, 1994). The author goes on to explain that qualitative research design inherently has a system of checks and balances, which includes staying in a setting over time and interpreting meanings in individual's lives. One means of validating the results of such studies is triangulation, which according to Janesick (1994) is made possible by staying in a setting over time and allows for multiple views of framing the problem, selecting research strategies and extending discourse across many fields of study. Triangulation can be any of four types including data, investigator, theory and methodological and interdisciplinary triangulation. In this study, data triangulation is demonstrated by the researcher's use of various data sources such as interviews and documents. The synthesising of innovation diffusion and social construction of technology theories demonstrate theory triangulation.

4 STUDY RESULTS

As previously identified in the literature, availability, quality, speed, cost and suitability of broadband remains an issue for SMEs. We therefore set out to seek the views of the two social groups on the supply side regarding these issues in addition to the perceived innovation attributes which include compatibility, complexity and relative advantage.

In the opinion of the interviewee, the SMEs are often misled by the promise of very cheap or free broadband. In his words 'SMEs do have a perception about technology. They think that technology is so cheap because they see broadband prices keep falling and falling and there's all this talk about free broadband from other vendors'. In his experience however, the interviewee stated that there is no free broadband in the UK. What the interviewee thought happened as opposed to the companies offering free broadband only subsidise one product set from the other and do not really offer free broadband. The SMEs, in the experience of the interviewee from the vendor company, do not like to pay a lot of money for technology because that is not what they are trading in directly. As a result, they would rather pay a little for broadband and in turn, they do not get the kind of service that they would be happy and content with.

The interviewee agreed that there are quite some problems with the quality of service that broadband vendors provide. This is particularly evident with SMEs who buy cheap. The vendor is of the opinion that they will have a problem in that the service level agreement (SLA) determines what the price value perception is and in the vendor interviewee's experience none of the SMEs he has come in contact with have ever looked at the SLA. The interviewee is of the opinion that SMEs are faced with all kind of misleading information about the speed and quality of broadband that is available to them. SMEs get poor service from other vendors according to the vendor interviewee, because what they see on the advert is not what they actually get but they do not bother to read the SLA, which shows the level of service the vendor is willing and able to provide.

Although many SMEs that have adopted broadband only use it lightly mainly for communication, according to the vendor interviewee, pressure can be put on SMEs to adopt certain technologies and practices as a result of their association with larger companies. This could be a deciding factor for whether or not SMEs choose to adopt broadband or other associated technologies. In addition, the idea of SMEs not working in isolation but to work in networks and communities could also present a need for them to adopt broadband fully. This is because as pointed out by the vendor interviewee, in order for the SMEs to form networks they need to have shared working space and to have shared working space, they would need broadband.

While there is no doubt that the social groups including the SMEs prefer the use of broadband to dial-up for their Internet connection, there are many issues that have to be considered. For instance, the cost of obtaining broadband may not be significant for some SMEs, for others they could see it as an unnecessary expenditure. In the opinion of the vendor interviewee, SMEs do have their own problems, which include how to get new customers or clients. To enjoy the benefit of broadband adoption in full, some level of education will be needed and this can prove too much of a disturbance for some SMEs. When it comes to the issue of funding, there is a difference when it comes to the location of the SMEs. SMEs in rural areas tend to receive more government support than SMEs in the urban areas. The interviewee from the government agency said that funding was available to help SMEs who were interested in adopting broadband and other ICT technologies. The interviewee from the government agency made it clear that most of the support was for the SMEs in the rural areas.

The vendor interviewee was of the opinion that diffusion and full exploitation of broadband should not be left in the hands of others who have not got as much to loose. Several applications run on the back of broadband. The vendors of such services also have a part to play in educating the SMEs on the adoption and full use of broadband. It might not directly generate money to educate the SMEs, but in the long run, the vendors will surely benefit if SMEs gain an adequate understanding of the technological innovations and use it to its full potential. The vendor interviewee also opined that it would also be particularly useful if the government bodies that are involved in educating and encouraging broadband adoption and use also take the time to listen to the SMEs, identify their individual needs and then get an adequate understanding of the technology themselves. When these government bodies have an adequate understanding of the technology, then will they be in a good position to offer aid to the SMEs that need the particular technology. It is important to note that not all SMEs are the same. To generalise and assume that they are is going to help a few SMEs and not reach as many as is possible. In addition, the focus for the government agencies concerned with broadband adoption by SMEs should be on their adequate and full exploitation of the technology first, before

advocating or pushing for higher broadband speed in a situation where the limited speed that is available is yet to be used in full.

Unfortunately, as opined by the vendor interviewee, the SMEs do not take the time to find out how to exploit various technologies because it shifts their focus and takes time and money away from doing their actual business. In many cases, it is the usual practice to feel that SMEs need so much support and so much help, but they also need to be able to take responsibility for whatever will improve the way they run their business. Also, while it might be a good idea for the SMEs to wait for technology to become cheaper, it might take away the advantage of being able to compete with other SMEs or larger companies. While attempting to save money they sometimes have obtained their service from the cheapest provider who in turn provides poor service. In addition, because SMEs do not have or take out the time to research the technological innovation, in this case broadband, they only consider what the advert states and not what they are getting in reality. It is important to determine how the individual SMEs' needs would be met with the adoption of broadband and associated technologies. It is not enough to assume that because it is available and there is an incentive to obtain it, that the SMEs will use it in its entirety. In some situations, the SMEs may have no choice but to adopt certain technologies. For instance, SMEs that have to trade with larger companies might be in a situation where they are forced to adopt technologies such as broadband because that is the only way they can trade with those larger companies.

5. DISCUSSION

The SCOT concept of a technological frame refers to the ways in which relevant social groups attribute various meanings to an artefact. This concept is broad and includes different elements such as current theories, goals, problem solving strategies, and practices of use, which focuses on consumer practices. Technological frames are a link between relevant social groups and artefacts, and just as they can be viewed as constructing an artefact, so can they be viewed as constructing a relevant social group, (Bijker, 1995, p195). The goals and problem solving strategies, which are elements of a technological frame, of the two social groups regarding broadband diffusion to SMEs have a few similarities but are mainly quite different. As can be observed in the views discussed, the vendor and the government's regional development agencies have different ideas about broadband and its diffusion to SMEs. This is evident in the government's push for greater broadband speeds when businesses are yet to make full use of the speed that is available. Also in the opinion of the vendor interviewee, the government agencies are only beginning to understand broadband technology and its application. They are therefore not in a position to adequately educate the SMEs on the effective use of broadband. The difference in the approaches of these social groups is also evident in the way that the SMEs are perceived. The government agencies approach to encouraging broadband adoption to SMEs is general and targeted towards all SMEs. The interviewee from the vendor company however raised the importance of dealing with each SME as individually as possible. This is because they are all unique and each of them has different needs. Additionally, the government, as a result of the importance placed on the SMEs and the way they are viewed as helpless, are of the opinion that they need all the help that they can get.

This differs from the view of the vendor interviewee who was of the opinion that SMEs should start taking responsibility for adopting technology that would improve their businesses. This makes it evident as mentioned by Pinch and Bijker (1987), that problems seldom have equal pertinence for all the social groups. One of the issues that both of these social groups agree upon is the environmental aspect of broadband diffusion. As highlighted by the interviewee from the regional development agency. Transportation and congestion are problems that the UK government have been confronted with. One of the solutions to the congestion was that more businesses should consider working from home without having to travel. The interviewee from the vendor organisation also stated that broadband provides the possibility of working remotely. This is an important driver for broadband diffusion and that is why the government has been encouraging its adoption.

A technological frame is composed of the concepts and techniques employed by a community in its problem solving (Bijker, 1987). Problem solving is a broad concept that should encompass the recognition of what counts as a problem as well as the strategies available for solving the problems and the requirements a solution has to make. The identification of the crucial problems with broadband diffusion to SMEs and the problem solving strategies taken by each of these groups is quite different. For instance, on the issue of cost, the interviewee from the government agency stated that cost was no longer a problem for the SMEs and that broadband is a lot more affordable now. The vendor interviewee however, did not think that cost was not a problem. In his opinion, as a result of the SMEs trying to cut costs and going for cheaper broadband solutions, they were loosing out on quality and not getting a decent service from the broadband providers. The difference in the technological frame within which each of the social groups involved in this study belongs is also evident in the issue of quality of service. The vendor interviewee stated that he was not aware of any SMEs that had ever looked at the service level agreement. This was however not pointed out by the interviewee from the government agency.

6   CONCLUSIONS, LIMITATIONS AND FURTHER RESEARCH

According to Parker and Castleman (2007) majority of the SME-eBusiness research focussed primarily on studying the SMEs themselves with limited research into the supply-side of innovation diffusion. We agree with the stance that diffusion of innovation studies have typically focussed on the demand side of innovation without a lot of focus on the supply side. As a result, we aimed to consider the supply side with a view to highlighting the roles and possible responsibilities of the players within the supply side of innovation diffusion.

The research has also considered various theories that have been used for the study of information technology use by SMEs. This has been done with particular emphasis on the innovation diffusion theory according to Rogers (2003) since his theory has been used in several research on diffusion of technologies. Furthermore, we considered the perceived attributes of an innovation that are important in explaining the rate of its adoption. These perceived attributes were explained and their importance discussed. Socio-technical approaches were also examined with particular emphasis on SCOT as a result of the need to consider various views of the various groups involved in broadband diffusion to SMEs. These relevant social groups were identified as seen in existing literature. Previous research studies that have applied the innovation diffusion and social construction of technology theories were also examined leading to the presentation of the initial framework that guided the research.

Based on the issues discussed in the previous sections of this research, the interpretive research approach within a qualitative methodology was selected as appropriate for this research. This is due to the fact that this study is exploratory in nature and because this approach is useful for understanding emerging phenomena within their context. The interpretive research approach was adopted because such an approach research can help IS researchers to understand human thought and action in social and organizational contexts and can help to produce deep insights into information systems phenomena.

Research was carried out using data obtained from fieldwork involving representatives of the identified social groups including representatives of a vendor and government development agency. The data collected was presented and analysed with aim of understanding the views of these social groups regarding the lack of awareness, cost, full exploitation, quality of service and innovation attributes of broadband. The views that have been analysed brought forward other issues that were not previously considered. These included the level of division between the social groups regarding their actions on broadband diffusion. For instance, where the government is of the opinion that SMEs need all the help they can get, the vendor is of the opinion that SMEs need to start taking responsibility for identifying and adopting necessary technology that would propel their businesses further. Another source of disagreement was the issue of continuity. While the government feel that many people have adopted broadband and are therefore in a position to demand greater speeds, the vendor states that they need to use the broadband speed they have fully. There are many differences in the way that the social

groups view broadband diffusion to SMEs. For example, the government's approach to broadband diffusion to them is general and targeted towards all SMEs. The vendor however, highlighted the importance of treating each SME as uniquely as possible because they all have different needs. An issue that these two social groups agreed on is the environmental benefit of SMEs' adoption and use of broadband. These examples showed the reasons for the differences that seem to dominate the scene of broadband adoption and use by SMEs.

Drawing from SCOT notions, the interpretive flexibility of broadband is evident in the UK SMEs' experience of broadband adoption. The government and the vendors have a long list of the uses and benefits of the technology but the SMEs seem to not have a good understanding of what the technology is and what it can do for their businesses. In order to achieve the possibility of closure (resolution of conflicts and reaching an agreement), these two social groups have to pay attention to what SMEs need, in terms of what aspect of their business processes need improvement and how broadband can bring about such improvements. In turn, the SMEs themselves have to take the time to research what certain technologies can do to improve their businesses and how they can.

There are several limitations that may occur when a researcher attempts to take an interpretive stance for a qualitative research. When interpretive research is employed, the researcher is unable to assume a value-neutral stance, and will usually be implicated in the phenomena being studied. The possibility of this limitation is acknowledged and has been addressed in this research by using material from various sources and eliciting views of the different social groups involved in the supply side of innovation rather than the view of the broadband providers alone. Furthermore, when eliciting the views of the social groups, in-depth interviews were employed. This allowed the views of the social groups on the supply side of broadband diffusion to unfold as they viewed it and not as the researcher viewed it (Marshall and Rossman, 2000).

This research contributes to the field of broadband adoption, innovation diffusion, social construction of technology and to policy and practice. It was possible to achieve some of these contributions after applying a framework that synthesised both the innovation diffusion and the social construction of technology theories. Although the diffusion of innovations theory accounted for some social issues involved in diffusion of technologies, social groups needed to be considered which resulted in the introduction of SCOT to ensure that the views of the social groups were adequately represented.

The research findings are not strictly related to SMEs and broadband diffusion. The findings could be useful for researchers considering studies in similar fields such as the diffusion of new technologies and other studies involving SMEs. Studies considering innovations such as ebusiness, egovernment and associated technologies may also find this research useful. The suppliers of similar technology could also benefit from this research. Additionally, although this study was set in the UK, it might be useful for researchers considering diffusion of broadband in other countries.

As we stated in the first section, this research set out to explore the supply side with a view to highlighting the roles and possible responsibilities of the players within the supply side of innovation diffusion. Further research would look into the relationships between the various factors that have been identified and the extent to which they have an effect on the diffusion process.

References

Agarwal, R. and Prasad, J. (1998) A conceptual and operational definition of personal innovativeness in the domain of information technology, *Information Systems Research,* 9(2), 204-215.

Beynon-Davies, P. and Williams, M. D. (2003) The Diffusion of Information systems Development Methods, *Journal of Strategic Information Systems,* 12(1), 29-46.

Bijker, W. (1987) The social construction of Bakelite: towards a theory of invention In *The Social Construction of Technological Systems* Bijker, W. E., Hughes, T. and Pinch, T.(Eds). 159-187.MIT Press, Cambridge, MA

Bijker, W. E. (1995) *Of Bicycles, Bakelites and Bulbs. Towards a Theory of Socio technical Change,* The MIT Press, Cambridge (Massachusetts).

Cooper, R. B. and Zmud, R. W. (1990) Information Technology Implementation Research: A Technological Diffusion Approach, *Management Science,* 36(2), 123

Crum, M. R.,Premkumar, G. and Ramamurthy, K. (1996) An assessment of motor carrier adoption, use, and satisfaction with EDI, *Transportation Journal,* 35(4), 44.

Gholami, R., Koh, E., Lim, J. (2010) The post adoption phase of broadband in small businesses, Information Resources Management Journal, 23(1), 35-52

ITU (2003) Promoting Broadband: Background Paper *International Telecommunication Union*

Kaplan, B. and Maxwell, J. A. (1994) Qualitative Research Methods for Evaluating Computer Information Systems. In *Evaluating Health Care Information Systems: Methods and Applications* Anderson, J. G., Aydin, C. E. and Jay, S. J.(Eds). 45-68.Sage publications, Thousand Oaks CA

Karahanna, E.,Straub, D. W. and Chervany, N. L. (1999) Information Technology Adoption Across Time: A Cross-sectional Comparison of pre-adoption and post-adoption Beliefs, *MIS Quarterly,* 23(2), 183-214.

Klein, K. K. and Myers, M. D. (1999) A Set of Principles for Conducting and evaluating Interpretive Field Studies in Information Systems, *MIS Quarterly,* 23(1), 67-94.

Kumar, S. and Swaminathan, J. M. (2003) Diffusion of Innovations Under Supply Constraints, *Operations Research,* 51(6), 866.

Lyytinen, K. and Damsgaard, J. (2001) The role of intermediating institutions in the diffusion of electronic data interchange (EDI): How industry associations intervened in Denmark, Finland, and Hong Kong, *Information Society,* 17(3), 195.

Marshall, C. and Rossman, G. B. (2006) *Designing Qualitative Research,* (4th ed.)Thousand Oaks, CA: Sage.

McLoughlin, I. (1999) *Creative Technological Change: The Shaping of Technology and Organisations*, Routledge, London

OECD (2003) Broadband driving growth: Policy responses [Online] Available: http://www.oecd.org/dataoecd/18/3/16234106.pdf [Accessed 07/07/ 2010]

Ofcom (2004) The Communications Market 2004

Ofcom (2007) The Communications Market 2007

Ofcom (2009) The Communications Market 2009

Oni, O. and Papazafeiropoulou, A. (2008) 'A socio-technical approach to broadband diffusion by SMEs', *Int. J. Knowledge Management Studies*, 2(3), 335–348.

Papazafeiropoulou, A., Gandecha, R. and Stergioulas, L. (2005) Interpretive flexibility along the innovation decision process of the UK NHS care records service (NCRS). Insights from a local implementation case study In Proceedings of the Thirteenth European Conference on Information Systems Regensburg, Germany

Parker, C.M. and Castleman, T. (2007) New directions for research on SME-eBusiness: insights from an analysis of journal articles from 2003 to 2006. *Journal of Information Systems and Small Business*, 1(1-2), 21-40

Pinch, T. J. and Bijker, W. E. (1987) The Social Construction of Facts and Artefacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other In *The Social Construction of Technological Systems* Bijker, W. E., Hughes, T. P. and Pinch, T. J.(Eds). 18-50.MIT Press, Massachusetts Institute of Technology

Ramdani, B. and Kawalek, P. (2007). SMEs & IS Innovations Adoption: A Review & Assessment of Previous Research. *Revista Latinoamericana de Administración*, 39 (1), 47-70

Ramdani, B., Kawalek, P., and Lorenzo, O. (2009) "Predicting SMEs' adoption of enterprise systems", *Journal of Enterprise Information Management*, 22 (1/2), 10 - 24

Rajagopal, P. (2002) An innovation-diffusion view of implementation of enterprise resource planning (ERP) systems and development of a research model, *Information & Management,* 40(5), 87.

Rogers, E. M. (2003) *Diffusion of innovations,* Free Press, New York.

Seemann, M. (2010) UK Broadband for SMEs: not fit for purpose, *Business Computing World*, June 2010.

Tornatzky, L. G. and Klein, K. J. (1982) Innovation Characteristics and Innovation Adoption-Implementation: A Meta Analysis of Findings, *IEEE Transactions on Engineering Management,* 29(11), 28-45.

Walsham, G. (1995) The Emergence of Interpretivism in IS Research, *Information Systems Research,* 6(4), 376-394.

Woolgar, S. (1996) Technologies as cultural artifacts In *Information and Communication Technologies: visions and realities* Dutton, W. H.(Ed). 87-102.Oxford University Press, Oxford