Using Phenomenological Constructivism (PC) to Discuss a Mixed Method Approach in Information Systems Research

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Abstract: This paper used phenomenological constructivism to demonstrate and evaluate a mixed method approach for conducting information systems research. It evaluated the implementation and implications of mixed methods approach as an exploratory and inductive research method. A case study which made use of in- depth interviews was used to provide the dominant qualitative (QUAL) method. Following this, a questionnaire survey was used to provide the results for the less dominant method which is the quantitative (QUAN) data. The mixed method approach was adopted to enhance the completeness and accuracy of the interpretation of the study. It provided a number of recommendations for the use of mixed methods approach for IS projects.

Keywords: Case study, Information systems, Mixed methods, Phenomenological constructivism

1 Introduction

Information systems (IS) projects typically adopt a positivist approach, which primarily focus on the development process associated with the technology rather than the perception and perspectives of the people involved (Bharadwaj, 2004). The constructivist paradigm (CP) focuses on the understanding of the social world through subjective experience. Burrell and Morgan, (1989) claim that such a perspective "seeks explanation within the realm of individual consciousness and subjectivity, within the frame of reference of the participant as opposed to the observer of the action".

This paper discusses an IS research project that adopted a phenomenological constructivist approach, which seeks to interpret, understand as well as explore a number of socially constructed phenomena (Howell 2013) in human activity systems, namely to understand the sociological aspects in the software development setting as it focuses on human thought and action in social and organizational contexts. It tries to understand all the nuances of the phenomena at issue, in order to obtain clarification and insight into the situation, namely the identification of risks and knowledge leakage (KL) in virtual environments. The underlining premise of the study is based on a case study approach supported by risk typologies and conceptual understandings drawn from the literature review, exploratory interviews and a survey. This study aimed to detect and appraise the necessary security and risk management issues surrounding the development and acquisition of virtual environments and this was achieved using this approach. Interpretation of the data was used to understand social constructions and develop a risk identification technique which can be used for comprehending how people deal with risks in organisations and business. Furthermore, since not much has been written about the risk of knowledge leakage resulting from virtual reality environments (VREs), obtaining both the perceptions and perspectives of various individuals, as well as reaching a consensus within a population, assisted with the generalisation of the findings. However, using a mixed method approach should depend on the research objectives and/or questions rather than a particular preference for a method or field of study. Thus, it makes the case for using an IS case study with a mixed method approach which not only extracts the perceptions and perspectives of participants but also provides trustworthiness and validity regarding individual perceptions of the VR environments. The discussion employs levels of reflexivity and acknowledges the multi-faceted reflections this engenders.

2 Methodology: Phenomenological Constructivism

Phenomenological constructivism (PC) embraces a wide range of philosophical and sociological stances, which share the common characteristics of attempting to understand and explain the social world from the perspective of the actors directly involved in the social process (Burrell and Morgan, 1989). It assumes that

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knowledge, within the domain of human action, is a necessary social construction and therefore inevitably subjective (Walsham, 1993). "Phenomenology provides us with interpretations regarding the distinctions between the internal and external world as well as levels of objectivity and subjectivity … for phenomenology there is a general comprehension that there is a relationship between mind and world" (Howell, 2013, p.55). Constructivism considers that reality is based on shared experiences and research results are "created through consensus and individual constructions, including the constructions of the investigator" (Howell, 2013 p.87). PC perceives the social world as a social process that is continuously developing and evolving – which consists of a network of assumptions and shared meanings. In this paper, through PC we seek to understand the perceptions and perspectives of the people who are involved with the development and use of the IS and recognising that organisations and subgroups will develop shared meanings or perceptions that are more subjective in nature than objective.

From an ontological perspective PC views the social world as extremely complex and problematic, where the researcher seeks to interpret, understand, experience or produce the very basis and source of social reality (Burrell and Morgan, 1989; Howell, 2013). Fundamental motivations for adopting PC for this study are based on the idea that the success or failure of an IS and the delivery of benefits is dependent on utilisation and the people using the technology. Based on a phenomenological perspective Feenberg (1991, 1999) argued that technological objects enter experience when we notice them as useful and the design of the said technology involves ontological decisions each of which has political consequences. Technology may be analysed on two levels, original function as well as design and implementation. This study concentrates on the latter and considers that technology is not autonomous to human existence, it is socially constructed. Indeed, such enables a constructing subject to be involved in the formulation and more importantly subsequent implementation of technology. Consequently, this approach seeks to understand management, developers, users, customers, and suppliers' perception of the IS. These human participants affect the system as their interpretation of reality and shared experiences create complex interacting contexts and meanings upon which the system is developed. PC is therefore complementary to the central theme of this study, which considers the perspectives and perceptions of developers, customers and users concerning knowledge risk exposure in 3D photographic databases and the probability of the risks arising from this use and their interpretation of reality, shared and contested knowledge. It deals with the abstruseness of research in complex human activity systems under enquiry (no repeatable experiments, continuously evolving systems composed of a myriad different motivations, behaviours and constraints). Avison et al., (1999) argues that the exclusion of human factors in past research may have contributed to the dissatisfaction of users with conventional IS development. This is supported by Standish report (2005) in Sharma, et al., (2008) which purports that software project failure rates continue to be high with 71%, of software projects failing in 2004.

Based on these arguments and the need to extract the perceptions and perspectives of participants in the research, a PC stance was appropriate as the objectives were to:

- characterise and identify risks from the literature through extensive review;
- characterise and identify risks from the case study as well as validate from the literature review;
- use questionnaire surveys to validate and assess risks identified in the literature review and case study.

Here, eliciting the perception and perspectives of participants would provide deeper understanding into the issues surrounding the development of the software and associated risks, than a positivist approach which prohibits such rich descriptions.

Consequently this study describes a case study which developed a conceptual framework on knowledge management, risk management and risks identification techniques from theoretical frameworks. From the extensive literature review performed on the aforementioned concepts, the researcher is able to conceptualise the findings from the data collected in relation to the existing theories (Kumar, 2005). Thus, in order to perform the risk assessment required, it was necessary to perform the usual set of activities:

- Identification of the base-events
- Identification of the risks
- Ranking of the probability of each event occurring—with those with the highest probability at the top of the chart
- Determine the frequency of each event

- Determine the risk impact
- Determine the relative importance of the impact caused by the risk
- Prioritise the risks relative to each other.

This type of risk analysis study usually involves in-depth study of work practices, usage of the artefacts produced and experiences of agents using them. Since the trigger for this research emerged from practice within a particular organisational environment, the natural approach for the research was a case-study approach. Additionally, the problem to be investigated is an emergent and contemporary phenomenon, in which context and boundaries are not entirely clear, and thus are best researched within its real-life context.

3 Case Studies

The use of case studies as a research tool has become increasingly important in recent times. This is because case study research is excellent at simplifying complex issues or objects and can draw on experience and/or add to the strength of information from other researchers. A case study strategy, however, can be used for either one of three purposes – exploratory, descriptive or explanatory (Yin, 2003; Walsham 1993). This study describes an exploratory strategy.

During the design phase of case studies, theory building is very important. Thus the research design consisted of a "theory" of what is being studied which served as the blueprint of the study. Yin (2003) argued that theory development can be a long and difficult process.

Nonetheless, case study research is particularly well-suited to IS research in general since the interest has shifted to organisational rather than technical issues. According the Gomm, et al., (2000) good case studies allow for:

- the recognition of complexity and the embeddedness of social truths;
- the generalisation of either a solution or instances of that solution;
- the presentation of research or evaluation of data in a form more accessible than other types of research, thus making it more understandable and credible for practitioners and interested parties;
- the direct interpretation of results and transferability of solutions (Yin, 2003).

However, one of the major problems with case-study analysis is construct validity, that is, the establishment of appropriate understandings and correct operational measures for the concepts being studied. Thus, the investigator usually begins by establishing a conceptual framework, which is used to guide the project. This conceptual framework usually employs accepted theoretical constructs and artefacts as the foundation of the study. Consequently, at the end of the study the researcher is able to either support or disprove the construct, or suggest ways of modifying the theory or applying the theory to new situations which were not previously addressed. Since the study is exploratory, it was important that a good theoretical framework was developed as it not only helps in defining the appropriate research design and in data collection but is the main vehicle through which the generalisations of the results of the case study can be achieved (Yin, 2003).

A single case study was used since it is considered typical of other small and medium enterprises (SMEs) involved with 3D models. Owing to this, a case-study research design was implemented based on the triangulation of methods. Exploratory interviews were conducted which were primarily done to gain a better insight of VREs, their functionalities as well as the stakeholder's perceptions and perspective concerning general development and use of the software. The timeline for the study was from 2007 to 2012 as seen in Figure 1.

4 Research Design

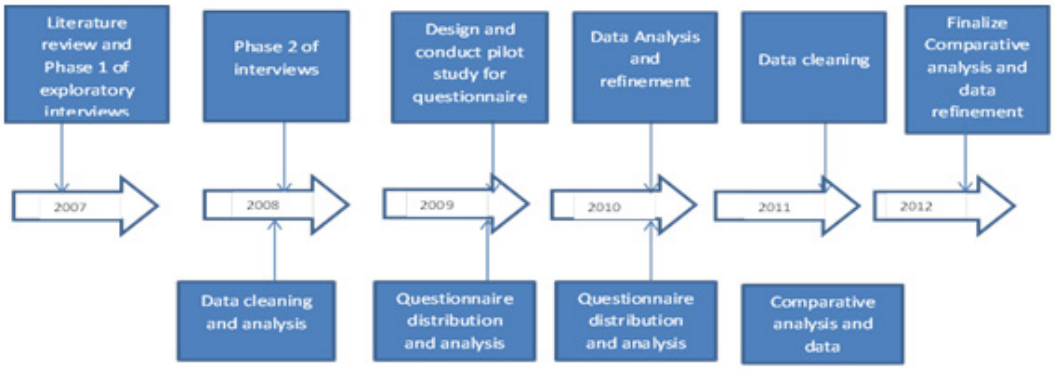

Figure 1: research Timeline

The rationale for integrating a PC with a mixed methods approach is based on the fact that the phenomenon under scrutiny needs to be understood, as little research has been done in the area of KL in VREs. Hence understanding the perceptions and perspectives of the people involved with the development and use of the IS would be significant, as within the organization subgroups will develop shared meanings or perceptions that are more subjective in nature than objective. A mixed methods design according to Creswell (2008) is useful when either the quantitative or qualitative approach by itself is inadequate to understand a research problem. The qualitative portion was useful in this case since the researcher did not know the important variables to examine and because existing theories do not apply with the particular group under study.

Hence in order to both generalize the findings to a population as well as develop a detailed view of the meaning of a phenomenon, a mixed methods approach was employed.

Consequently, the research design comprised two stages. First, an exploratory case-study approach was used for discovery and identification purposes. The strategy for the case-study data collection and exploration of stakeholders' views were devised as an iterative, consultative study. Second, a cross-sectional sector wide questionnaire survey was used in order to validate the findings emerging from the first phase.

This research developed and used the practice-based information systems research (PB-ISR) framework presented in Figure 2.0. This framework was designed adapting a general IS research framework proposed by Galliers (1992). This PB-ISR framework is particularly useful for projects, where research questions emerge from real-life organisational processes and problems encountered in practice. However, in order to extend the body of theory in IS, there is a need for research to be informed by extant theoretical constructs and understandings and supported by a thorough methodological approach, which is possible through the adaptation of the PB-ISR framework as presented.

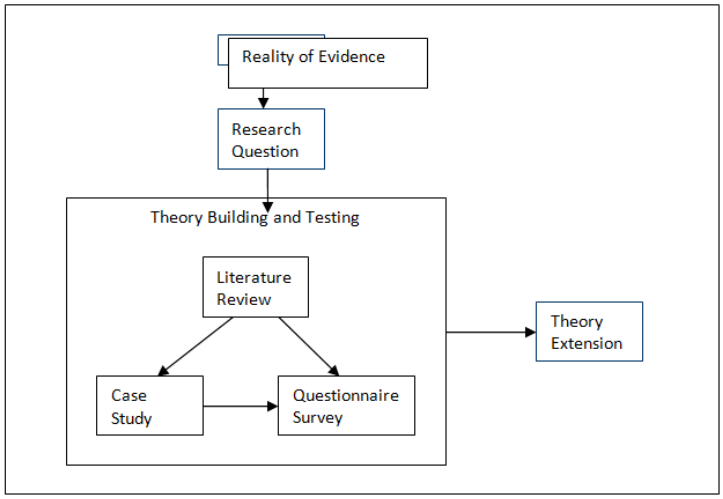

Figure 2: The PB-ISR framework: a research framework to support practice-based IS research questions

Hence as seen in the 'theory building and testing' section of Figure 2.0, methodological triangulation was adopted as it involves the use of multiple methods to study a single phenomenon. Methodological triangulation ideally includes both qualitative and quantitative data. This type of triangulation involves the combination of methods which is based on the dominant—less dominant qualitative and quantitative methods referred to as: QUAL—quan, QUAN - qual triangulation (Creswell, 2007). Accordingly, a dominant qualitative method with a supporting quantitative method (QUAL – quan) was employed. The qualitative study was exploratory (interviews) and involves the use of a case study, followed by a sectional questionnaire survey for validation purposes (Tashakkori and Teddlie, 2009; Creswell, 2007). Triangulation was used to enhance the accuracy of the interpretation of the study. It was also used to test the validity and reliability of the study by confirming that the data collected is not due to circumstances or chance (Creswell, 2009).

Since not much has been written about the KL risks resulting from VREs, obtaining both the perceptions and perspectives of various individuals as well as reaching a consensus within a population assisted with the generalisation of the findings.

4.1 Research Aims and Objectives

In this study, the problem emerged from the fact that using VREs may result in KL risks. Despite the many advantages offered by VREs, their very nature poses clear knowledge exposure risks. The fact that the environments produced are intuitive, realistic, browsable by association and link to comprehensive specialised and technical databases, poses clear knowledge exposure and security risks. For the case organisation, the problem was particularly complex, since they produce these virtual environments on behalf of very specialised and high-tech companies. These companies in turn make these 3D models available both internally and externally to their customers, either to individuals or third party companies. Thus the aim of the project is to identify and assess the KL risks associated with the design, development and use of VREs.

4.2 Research Data

Data can take two forms: quantitative and qualitative. Qualitative data is generally concerned about people and their social reality. This constructed reality has already been interpreted by the individuals, thus the investigator must understand the motivation behind an individual's interpretation of the situation as well as the activities based on these interpretations (Bryman, 2003). Therefore, through the use of in depth interviews and observations the researcher is able to provide deep, rather than broad set of knowledge about the phenomena under scrutiny. Consequently, exploratory interviews were undertaken with the Technical Director, Development Director, Security and Database Administrator and the Sales and Marketing Director, Lead Software Developer and Software Programmer. Interviews were the primary exploratory tool and were conducted in order to gain a better understanding of the product and the risk management issues surrounding its functionalities, stakeholders' perceptions and perspective during development and use of the software. The interviews were conducted to provide a more technical description of the software development process.

On the other hand quantitative data is typically exemplified by the use of surveys and experimental investigations, tends to investigate cause and effect (Bryman, 2003; Creswell, 2009). Quantitative data was obtained from a small scale customer's survey as well as a cross sectional survey and were used to rank and prioritise the risks identified from the interviews. Hence the researcher examined the probability and frequency of risks occurrence as well as the impact to the organisation. Questionnaires were employed to further explore any ambiguous aspects in the data collected as well as to serve as validation tools.
Based on the results the data were grouped into a number of categories. These were namely:

- Organization Characterization
- Risks Associated with the Design and Development
- Risks Associated with the Use
- Inherent Risks Associated with the Nature of the software
- Knowledge Leakage
- Risk Management

Although there are clear differences between qualitative and quantitative data authors such as Bryman (2003), Creswell (2007), Onwuegbuzie and Leech (2005), Brannen, (2005) and Hathaway (1995) have argued that the choice between using qualitative or quantitative data has less to do with methodologies than it does with positioning oneself within a particular research paradigm. Therefore, rather than discounting either approach

for its drawbacks, one should seek the most effective ways to incorporate elements of both to ensure that their studies are as accurate and thorough as possible (Onwuegbuzie and Leech 2005).

5 Mixed Methods Approach

Since both qualitative and quantitative data have strengths and weaknesses a combination of both focuses on the strengths of each. The mixed method approach has a number of distinct advantages, namely:

Triangulation: involves combination of different data sources to study the same phenomenon. That is the researcher is seeking a convergence of results thus increasing the validity of the findings;

Complementary: entails examining overlapping facets of the phenomenon. For example, it is often helpful to conduct focus groups to inform the development or selection of a questionnaire;

Initiation: involves discovering the paradoxes, contradictions, and fresh perspectives on the issues surrounding the phenomenon;

Development: using the methods sequentially, so the results from the first method inform the use of the second method;

Expansion: is adding breadth and scope to the project;

In addition, mixed methods promote greater understanding of findings. That is, quantitative data can demonstrate that change occurred and by how much, qualitative data helps the researcher to understand why this change occurred (Brannen, 2005). A mixed method approach provides the researcher with a better understanding of a research problem (Tashakkori and Teddlie 2009; Creswell, 2009). Therefore, in order to minimise the weaknesses inherent in a single approach, convergence of the results was sought by using a mixed method approach (Brannen, 2005).

5.1 Quality Criteria

With the rise of an audit culture and the concern for assessing quality in mixed methods research it important to note the type of quality criteria that were applied to this study. Typically qualitative studies are less desirable than quantitative research, which is widely agreed and accepted. This cause for concern is due to a number of factors: firstly, is the lack of rigidity which tends to influence its findings and conclusion. Secondly, it is believed that there is very little basis for scientific (nomic) generalization. Bryman et al., (2008) and Sale and Brazil, (2004) suggest that criteria for using a mixed method approach should be based on the criteria of the individual components.

Consequently, by using the PB-ISR framework, theory building and theory testing were performed via triangulation of literature review, case-study analysis and questionnaire survey. Literature review was required for construct validity and the survey for external validity. Internal validity issues were addressed within the design of both the case-study analysis and questionnaire survey. Therefore, the first part of the research consists of in an in-depth literature review, followed by further elaborations on the methodology and case studies. These two activities correspond to the first section of the theory building section in the PB-ISR framework.

Following the theory building the results of any case-study is always difficult to validate and generalize, in order to achieve theory extension there is the need to address problems of external validity. This is a major problem when doing case study, as critics typically believe that a single case is a poor basis for generalization beyond the immediate case. However, according to Yin (2003) this criticism is unwarranted as during a survey research the use of a sample is readily accepted as a generalization of a larger universe. This generalization, however, is not automatic as a theory must be tested through replication of the finding or combination with other methods of research. Here, generalization of the results was achieved through a sector wide cross-sectional questionnaire survey. This survey forms the third section of the theory building triangle in the PB-ISR framework as seen in Fig, 1.0.

5.2 Triangulation

Triangulation was used to enhance the accuracy of the interpretation of a study. It can also be used to test the validity and reliability of the study by confirming that the data collected is not due to circumstances or chance. There are four basic types of triangulation identified by Lincoln and Guba 2000).

Data source triangulation: this involves the use of a variety of data sources and determining whether the case being studied remains the same at all times or interacts differently. Data source triangulation is employed to determine if what is being reported is the same as what is being observed. Lincoln and Guba (2000) suggest an additional value to source triangulation is *contextual validation*. In this the authors proposes "the validity of evidence can be assessed by comparing it with other kinds of evidence on the same point".

Investigator triangulation: several researchers are employed to observe the same phenomenon or scene.

Theory triangulation: use of multiple perspectives to interpret a single set of data. Since no two researchers will observe and interpret things entirely the same way, whenever the data of these researchers are compared and similarity exists, then there is some theory triangulation.

Methodological triangulation: is the most recognised type of triangulation and involves the use of multiple methods to study a single phenomenon or program. With multiple approaches to a single case study the researcher is likely to clarify or annul some extraneous influences. It ideally would include both qualitative (observations and interviews) and quantitative (descriptive statistics).

The purpose of triangulation in this study was twofold. Firstly, two or more methods were employed to address different areas of the same research question, thus extending the breadth of the study. This allows for the cross validation of the information – as the information is collected from several sources regarding the same event. This inevitably increased the quality of the research therefore conclusions drawn were more likely to be correct and accepted. Secondly, by using different research paradigms the researcher is able to compensate for inherent weaknesses in any of the chosen methods – especially when qualitative methods are used in conjunction with quantitative methods.

Hence the rationale for using a mixed method research was based on the research questions guiding the study. The findings from the study were also integrated and not left to the distinct component (Bryman et al., 2008).

5.3 Exploratory Interviews (QUAL)

Supported by risk typologies and conceptual understandings from the literature, exploratory interviews were undertaken with key management and technical personnel within the case company. Semi structured interviews were used in addition to the predetermined questions, as it provides the interviewer the freedom to probe for answers (May, 2003). These interviews allowed for an early identification and analysis of risks and were conducted to provide a more technical description of the software design and development process. Even though interviews are useful sources for providing insights into people's experiences, opinions, values, aspirations, attitudes and feelings (May, 2003), the data gained from these interviews are generally limited to the knowledge, experience and perspectives of the respondents.

Data analysis of qualitative data begins with the identification of key themes and patterns (Coffey and Atkinson, 1996). Based on the interviews, initial data analysis was conducted via a question by question summary. Following this, open coding was used to identify, name, categorize and describe significant themes and issues found in the interview scripts. The codes emerged from actual terms used by the participants as well as those in existing theory and the literature (Saunders et al., 2000). Consequently, for open coding each sentence in the interview scripts was scrutinized in relation to risks identification and KL risks in VREs; this enabled the broadening of the research focus while keeping within the exploratory confines.

Following this, axial coding was used to identify the relationships between the categories of data that emerged from the open coding process. As the relationship between categories were identified they were rearranged based on a hierarchal system with sub categories emerging (Saunders, et al. 2000). Hence, axial coding was used to determine the risks arising from each vulnerability as well as the consequences associated with the risks identified (Coffey and Atkinson, 1996). Here, based on the key concepts and the associated risks, the

properties or consequences of each were examined via a combination of inductive and deductive thinking. From the categories emerging from the open codes, selective coding was used to categorise the different types of risks into key concepts (Saunders et al., 2000). The decision to assign concepts to the data was done to facilitate data condensation, thus making it more manageable. However, in addition to data reduction these concepts are used to link different sections of the data together.
The key concepts identified from this set of data were:

- Knowledge leakage
- Risks
- Risk management
- Knowledge management
- Security

From these concepts, relevant phenomena and examples were identified and selected to support such occurrences. Here similarities and differences were identified with a number of emerging patterns and structures, thus facilitating a more diverse analytical scrutiny (Coffey and Atkinson, 1996).

Based on the risks and key concepts identified from employing open, axial and selective coding, testing of these phenomena was done via the use of a questionnaire survey

5.4 Cross-sectional Survey (QUAN)

The research employed a questionnaire survey which was used to validate the findings of the case-study by querying the industry sectors that are involved in the design, development and use of 3D virtual models. The aim was to determine whether the risks identified from the case study were a true representation of perceptions in the sector. When it was determined that the questionnaires met the required standards, via a series of pilot tests, they were distributed. It is believed by the researcher that by testing and establishing relationships between the variables identified from the case study, sequential triangulation is achieved. As the first phase of the research – the case study -- was used to inform the second phase, -- the survey (Creswell, 1994). Therefore the survey was used to determine the differences or similarities in the perspectives and perceptions obtained in the case study thus validating the findings from the case study (Tashakkori and Tweddlie, 2009). Additionally, in terms of the PB-ISR framework, this cross sectional survey forms the third and final vertex for the triangulation of methods outlined in the theory building and testing phase of Figure 1.0.

Questionnaires were sent to small and medium size companies and targeted a wide target group within the organisation with different job functions. The questionnaire followed a similar format to the case study questions; the initial questions were geared towards developing a profile of the respondents to determine the level of experience and expertise a particular individual may possess.

Unstructured open-ended questions were used in order to encourage participants to construct their own meaning of the phenomena – meanings that have been forged through discussions and interactions with other individuals within the organisation. Thus participants were able to express their views as there were no predetermined sets of responses. This increased the likelihood of receiving more useful and insightful suggestions, as it is impossible to predict the full range of opinion. This is especially useful in exploratory research, such as this, where the researcher was validating and investigating the KL risks arising from VREs (Saunders et al., 2000).

Closed questions were employed to validate the risk identified in the case study and its primary customers as well as the risks mitigation strategies and/or security technologies employed to protect the organisation from the KL risks in the VREs. The majority of these closed ended questions were multiple choices, where participants were required to consider all possible responses.

Data analysis for the survey was done using univariate and bivariate descriptive data analysis, both techniques involves the use of a number of tools which includes: frequency counts and distributions, summary values for frequencies and/or comparison between categories, pictorial representations of distributions and contingency tables/correlations.

In order to assess the strength of the relationship between two variables a non parametric test was employed, the Spearman's rank correlation coefficient determine the significance of the cross tabulations (Somekh and

Lewin, 2005; Saunders et al., 2000). The coefficient of this rank correlation varies between -1 and +1 therefore it provides information on both the strength and direction of the relationship. Owing to the fact that this rank is a non parametric test it can be used in a wide variety of contexts as it makes fewer assumptions about the variables (Bryman 2003). Spearman's rank correlation coefficient is especially useful with small numbers or when the items have unique ranks and categorical data (Blaikie, 2003).

6 Discussion and Reflection

A phenomenological constructivist approach which focused on the perceptions and perspectives of stakeholders and end users, involved in the design, development and utilisation of the VREs was employed for this study. It was perceived by the researcher that these viewpoints were essential not only for risks identification purposes but also for the purpose of theory testing and development. With qualitative and quantitative data sources the researcher was able to clarify as well as annul extraneous influences, which became apparent from the analysis of the case study. For example, a number of surprising issues arose during analysis of the interview discussions, such as the as the verisimilitude nature of the software. Since models for the system were developed using photographs, in a dynamic environment changes will be imperceptible. This is particularly important, for example, for maintenance work and health and safety issues, where every detail is significant to determine the difference between life and death. These virtual environments also needed constant updates. Likewise, no formal mechanisms existed for the identification and protection of strategic knowledge within the organization. Having this information available to the different employees increased the risks of knowledge leakage, as inadequate security mechanisms open the organisation to unauthorised access or systematic downloading of the information as data within these environments were readily interpreted.

However, even though management were aware of risks, formal risk management strategy was not adopted. Thus, management had an over-optimistic or even seemingly lax attitude towards risks and security incidences. Therefore, it was necessary to determine whether these risks were unique to the subject of the case study. Consequently, these perceptions of the risk identified and their impact were tested in the wider UK population with companies that are involved in similar developments and uses of the VREs.

It soon became apparent that utilising mixed methods data heightens the complexity of the study as the researcher had to sift and analyse different types of data. However, this was worthwhile as by using different sources in the data collection and analysis stage the researcher was able to build on the strengths of each type of approach, thereby minimising the weaknesses of any single approach. For example, the case study provided the developer's point of view, which focused primarily on the design and development of the VREs. These were relatively novel, with new and emerging challenges. This made the development cycle quite demanding and as a result longer. Hence developer's primary concerns and risks varied from their customers. Consequently, the questionnaire was used to identify primary customers' perspective on the use of the VREs and the cross-sectional survey to validate and rank the outcome of both perspectives.

Therefore, not limiting oneself to a particular approach provided a better opportunity to understand the phenomena under scrutiny, thus separating the unique from the generalisable. Consequently, this approach was invaluable in capturing the best of both qualitative and quantitative data. It not only allowed initial exploration into participants' perceptions of the associated risks of VREs but facilitated their validation in the survey. This approach was useful for the generalisation of a finding as well as to develop a detailed understanding of a phenomenon. In addition, since all research methods have limitations that prevent a researcher from simultaneously achieving high external validity, accuracy in construct measurement and the creation of realistic environments for observations, employing a mixed method approach adds to the rigour of the research methods. The PB-ISR framework was developed as it offers support for theory building and theory testing via triangulation of literature review, case-study analysis and questionnaire survey. Literature review ensures construct validity for both the case study and the survey. The latter ensures external validity and generalisation of the findings. Internal validity issues, on the other hand, were considered within the design of both the case-study analysis and questionnaire survey. Therefore, the development and testing of PB-ISR frameworks ensured construct, internal and external validity.

By using triangulation researcher was able to address different areas of the same research question thus extending the breadth of the study. This allowed for the cross validation of the information – as the information was collected from several sources regarding the same event or behaviour. This inevitably

increases the quality of the research; therefore conclusions drawn would be more likely to be robust. Consequently, the underlying principle driving this research was the qualitative method as interviews provide the bulk of the information, in addition to the use of both open and closed ended questions in the questionnaires.

In sum, using a mixed method approach in this IS research was quite useful in building and extending theory. From this study the researchers were able to identify and assess the risks associated with VREs as well as provided relevant rich descriptions of the how and where they may occur.

7 Conclusions

There are a number of prejudices against the use of phenomenological constructivism in general and case study research in particular. Evidence of this is reflected by the notion that qualitative methods cannot access some of the phenomena to which IS researchers are interested. Consequently this area of research has been dominated by the positivist model of investigation. Hence, based on the paradigmatic differences concerning the phenomenon under study, we propose using PC to discuss a mixed-methods approach that we believe is both methodologically and philosophically sound. While using a positivist approach for guiding research is crucial for a rapidly evolving field like IS, by being too restrictive, it would result in unfocused and fragmented research. By employing the PC and mixed method the researchers were able to provide a complete and robust understanding of the phenomenon under scrutiny.

Developing and testing of relevant frameworks such as the PB-ISR guaranteed construct, internal and external validity, which are paramount in order to produce validated and reliable empirical findings necessary to establish a solid IS research field. Therefore, the theoretical framework and the mixed method data used in this study ensured the accuracy of triangulation and clarification or annulment of any extraneous influences, thus validating results and interpretation.

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