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ABSTRACT

This paper discusses the significance of mixed methods research in information systems (IS) research. Mixed methods research allows a more holistic view in studying information systems (IS). It is useful in understanding the information systems world which is both social and natural in nature to present a full picture of the phenomenon. Mixed methods research therefore removes the limitation of the traditional approaches as one approach's weakness is complemented by the other approach's strength. The mixed methods research rationale is that no single research approach is sufficient by itself to capture the breadth and depth of complex IS research. This study is guided by the following question: What is the significance of mixed methods in information systems research? This paper therefore argues that mixed methods research provides an escape for IS researchers from the trap of seeing research as a single research design instead of benefiting from the best of both worlds.

Keywords

Philosophy, ontology, epistemology, paradigms, pragmatism, quantitative, qualitative, mixed methods, information systems

INTRODUCTION

Research is important for purposes of knowledge production. The aim of this paper is to discuss the value of mixed methods research. Creswell and Plano Clark (2011) argue that the researcher should articulate the philosophical assumptions that provide the foundation for any research. The philosophical assumptions provide the paradigms that shape the development of a research project. The researcher needs to articulate how different paradigms are going to be integrated in answering the research problem. Creswell et al. (2011) contend that a philosophical framework helps to position and articulate how the design fits with the study. In a similar vein paradigm operate at a broader perspective level, theoretical foundations operate at a narrow perspective in research as a lens taken by the researcher to provide direction for different phases of the research project such as social theory.

The theory provides the framework that guides the nature of questions to be asked and which, ultimately, are going to answered by the study. The choice of data collection - quantitative and qualitative or both - is determined by the theoretical framework. From a study's perspective, the theory guides the formulation of the questions to be asked in the study and informs the procedures and major variables of the study. The theory also provides a framework for the data collection phase of the research (Caruth, 2013). This paper is organized as follows: section 2 presents the research paradigms, section 3 discusses mixed methods research; section 4 discusses the mixed methods research in information systems, section 5 concludes. The next section discusses the research paradigms.

RESEARCH PARADIGMS

Teddlie and Tahakkori (2009) define paradigm as various philosophical assumptions associated with a point of view in a study. Morgan (2007) note that there are several paradigms which exist simultaneously and compete in a given field. Therefore paradigms differ in terms of their philosophical elements such as ontology, epistemology, axiology, methodology and rhetoric as in highlighted Table 1 below.

	Positivism	**Realism**	**Interpretivist**	**Pragmatism**
Ontology: *The researcher's view of the nature of reality or being*	Eternal, objective and independent of social actors	Is objective. Exists independently of human thoughts and belief or knowledge of their existence (realist), but is interpreted through social conditioning (critical realist).	Socially constructed, subjective, may change, multiple	External, multiple, view chosen to best enable answering of research question
Epistemology: *The researcher's view regarding what constitutes acceptable knowledge.*	Only observable phenomenon can provide credible data, facts. Focus on causality and law like generalizations, reducing phenomena to simplest elements	Observable phenomena provide credible data, facts. Insufficient data means inaccuracies in sensations (direct realism). Alternatively phenomena create sensations, which are open to misinterpretation (critical realism). Focus on explaining with a context or contexts	Subjective meanings and social phenomena. Focus upon the details of situation, a reality behind these details, subjective meaning motivating actions	Either or both observable phenomena and subjective meanings can provide acceptable knowledge dependent upon the research question. Focus on practical applied research, integrating different perspectives to help interpret the data
Axiology: the researcher's view of the role of values in research	Research is undertaken in a value-free way, the researcher is independent of the data and maintains an objective stance	Research is value laden; the researcher is biased by world views, cultural experiences and upbringing. These will impact on the research	Research is value bound, the researcher is part of what is being researched, cannot be separated and so will be subjective.	Values play a large role in interpreting results, the researcher adopts both objective and subjective points of view
Data collection techniques most often used.	Highly structured, large samples, measurement, quantitative, but can use qualitative	Methods chosen must fit the subject matter, quantitative or qualitative	Small samples, in-depth investigations, qualitative	Mixed or multiple methods designs, quantitative and qualitative

Table 1 Comparison of research philosophies (Saunders, Lewis and Thornhill, 2008 p. 108)

Oates (2009) defines positivism as a scientific method inherited from the natural sciences that believes in an ordered and regular world view that can be studied objectively. The positivist approach assumption is that reality exists concretely, can be discovered, is measurable and is independent of the observers (Oates, 2009). Positivist and post-positivist views are mor associated with a quantitative research approach whereas interpretivist views are more associated with the qualitative research approach. On one hand, the paradigm debate has been reduced by the emergence of the compatibility thesis which states that mixing quantitative and qualitative methods is acceptable to answer the research problem (Teddlie et al., 2009). On the other hand, the incompatibility thesis, which claims that it is difficult to integrate methods from different paradigms, has been discredited by many scholars (Bryman, 2012). The next section discusses mixed methods research.

MIXED METHODS RESEARCH

Mixed methods research is a procedure for collecting, analysing and mixing or integrating both quantitative and qualitative data at some stage of the research process within a single study (Creswell et al., 2011). In mixed methods research, the philosophical assumptions guide the research inquiry at a broader level. Mixed methods research helps to resolve the limitation of using a single method design to understand the research problem. The research question, objectives and context

must be the main drivers of the selection of the mixed methods research approach (Teddlie et al., 2009). It is important to note that the selection of the method is based on the phenomenon's context.

Miles and Huberman (2002) contend that entertaining the mixed methods research rather than retaining a single method design helps quantitative and qualitative inquiries to inform each other in many important ways. As such, mixed methods research is seen as valuable as it provides new ways of thinking about the world from a social and natural science research perspective (Morgan, 2007). Mixed methods research may use quantitative approaches to identify individuals to interview based on the analysis of the numerical data (Venkatesh, Brown and Bala, 2013). Mixed methods research removes the restriction of using only certain types of tools for data collection associated with a single study design or to connect several studies to reach an overall objective (Teddlie et al., 2009). Mixed methods research therefore removes the barrier of methods adversaries as it provides a bridge for use of multiple paradigms as part of pragmatism (Creswell et al., 2011). The next sub-section discusses the mixed methods research paradigms.

Mixed Methods Research Paradigms

Creswell et al., (2011) note the existence of three main paradigms for mixed methods research, namely, pragmatism, transformative-emancipatory and critical realism. Some researchers suggest that pragmatism is the most suitable paradigm for justifying the use of mixed methods research (Teddlie et al., 2009; Greene, 2006). The pragmatic approach supports both positivist and interpretivist approaches in the same research study as part of abduction reasoning. According to pragmatism, the research question dictates the selection of the method and paradigm to be used in the research inquiry. Therefore, pragmatism provides a practical way of applying mixed methods research in a research project (Peng, Nunes and Annansingh, 2011).

Pragmatism is supported by the multiple view stance of mixed methods research which states that multiple paradigms may be used but must be explicit in their use (Agerfalk, 2013). Pragmatism philosophy is based on the assumption that no one approach is adequate to understand reality and develop knowledge. The essence is that, both the lived experience (qualitative) and the reliability of empirical counts (quantitative) are important for better understanding of a phenomenon. Pragmatism supports the view that epistemology issues exist on a continuum not a dichotomy of objectivity and subjectivity, which are two opposing poles. The next sub-section discusses the mixed methods research design.

Mixed Methods Research Design

The benefits of a mixed methods approach are not always obvious as it serves various purposes in a research inquiry. The researcher's appreciation of the purposes of the mixed methods approach may be important in understanding the goals and outcomes of the research inquiry. The main purposes of mixed methods research designs are complementary (combination of results), developmental (results from one informs the other), initiation (results questions other results) and expansion (where results extend breadth and range of inquiry). Completeness purpose in mixed methods research provides a holistic view of the phenomenon that cannot be achieved by one approach. Developmental purpose is associated more with a sequential mixed methods approach than a concurrent approach (Teddlie et al., 2009).

The main of the issues to consider in mixed methods approaches are the timing and ordering of the methods in the study (Morse and Niehaus, 2009). The ordering can be simultaneous (same time) or sequential (different periods). Mixed methods research design can be concurrent (each method independent of each other) or sequential (findings from one method or paradigm inform the other) to understand a phenomenon (Ivankova and Stick, 2007). The most common types of mixed methods designs are sequential explanatory, sequential exploratory, concurrent triangulation, sequential transformative, concurrent transformative and concurrent nested design (Morse et al., 2009). The next section discusses mixed methods research in information systems.

MIXED METHODS RESEARCH IN INFORMATION SYSTEMS

Although mixed methods research has received much attention in other disciplines like social science, it has been suggested that IS can also benefit because of its interdisciplinary nature (Warfield, 2010). The interdisciplinary nature of information system means that it includes different disciplines and paradigms making it necessary to use a mixed methods research approach (Peng et al., 2011). The suitability of mixed methods research in IS is based on the fact that some aspects are found in the scientific method which requires quantitative methods and other aspects are associated with social sciences which require qualitative methods (Warfield, 2010).

Traditionally the most common research methods in IS are quantitative and qualitative (Oates, 2009). The two traditional research methods have been found to have limitations to particular IS research situations. While the quantitative method has been found to be economical and efficient in collecting large samples of data, it has weaknesses in investigating social contexts associated with organisations. The qualitative method has been found to be suitable for investigating complex social phenomenon using interviews but has been found to be time-consuming and difficult to use to cover a large group of participants (Peng, et al., 2011). The use of social science theories from other fields such as psychology and organisation behaviour fits well with the IS/IT human element (Venkatesh et al., 2013).

Mixed methods research helps improve the validity of the research through triangulation and convergence of multiple and different sources of information (Venkatesh et al., 2013). Mixed methods research design can make contributions to IS theory and practice where most of the findings remained inconclusive because of the complexity of IS research. Venkatesh et al. (2013) suggest that a substantive theory stance is a valid and powerful paradigmatic position for mixed methods research in IS due to the nature of the field and the need to develop novel theoretical perspectives. The next section presents the conclusion.

CONCLUSION

This paper provided the rationale for using mixed methods research in information system research. This paper argues that the interdisciplinary nature of information systems makes it necessary to use a mixed methods research approach because some aspects of IS discipline are found in the scientific method, which requires quantitative methods, and other aspects are associated with social sciences which requires qualitative methods. In that vein, the diversity and complexity of the IS discipline, makes it necessary to use theories from both social sciences (qualitative) and natural sciences (quantitative) to understand phenomena.

The mixed methods research has, therefore, the potential to add more insight into issues of IS research diversity of application to practice, which is not possible with a single approach. In addition, the use of mixed methods research in IS, adds rigor and validity to the research through triangulation and convergence of multiple and different sources of information. Mixed methods research may therefore be a solution where a single method does not sufficiently provide insight into a complex phenomenon. The contribution of this paper is therefore to highlight the benefits of mixed methods research to information systems as way to emancipate IS researchers who are still trapped and prejudiced by traditional approaches.

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