

Qualitative Critical Realism in Information Systems Research

Abstract

Currently, undertaking qualitative multi-disciplinary studies in Information Systems (IS) domain has been increased. Accordingly, the congruence between research philosophy and methodology allows the IS researchers to identify the overall strategy of the study and avoid unnecessary efforts. Consequently, application of innovative research philosophies, such as critical realism, which benefits from ideas of multiple philosophies (e.g. positivism and interpretivism) is reflected to be more to meet the requirements of multi-disciplinary IS researches. Critical realism allows the use of a well-developed and well-structured path to the research through identifying core elements including mechanisms, structures, and events. This research attempts to provide a distinctive approach for unification of critical realism philosophy and qualitative research through a literature analysis and according to the supplies of qualitative approach and the idea of fishbone diagram. It also offers a novel strategy for the validation of qualitative research based on the qualitative validity criteria and the requirements of the empirical stratum of critical realism philosophy.

Keywords: Information systems, qualitative approach, critical realism, research methodology, research philosophy, validation

1.0 Introduction

Research methodology is the rationale for undertaking research that demonstrates a particular study has been carried out in an appropriate way. This implies that the research outcomes are reliable and useable for future studies (Wisker 2008). Research methodology has been categorised based on various principles and objectives. However, the most popular classification is carried out according to the nature of the phenomena and research subject, so that research can be conducted qualitatively or quantitatively. Quantitative research has originally studied natural phenomena, but now it is also conducted in the social sciences by quantitative survey, experiments, and other numerical methods. Qualitative research has been performed in social science and cultural phenomena, commonly by observation, interviews, questionnaire, and document analysis (Myers, 1997).

The focus of today's academic Information Systems (IS) research has moved from technological to organisational, process, and people challenges. Thus, the application of qualitative approaches and a search for a suitable philosophy for IS research has been enhanced (Myers, 1997).

The philosophical foundation (also called worldview or paradigms) influences the study and helps to identify its requirements. It demonstrates how the research should be conducted (Tashakkori and Teddli, 2010).

Various philosophies, including positivism, post-positivism, constructivism, interpretivism, critical realism, and pragmatism can be applied for academic research. Selection of a philosophy for research is a strategic choice that leads the researcher to generate, analyse, and evaluate data by applying appropriate methods (Crossan, 2003; Wisker, 2008; Maxwell, 2008; Creswell, 2009).

The congruence between research philosophy (which informs research questions) and methodology is critical, especially in qualitative research. Also, following an appropriate philosophy to some extent satisfies the methodological rigour and improves the quality of qualitative research (Fossey et al., 2002). Thus, exploring the philosophical foundation is a significant step as it allows the identification of the overall strategy of the study, avoid unnecessary efforts for the research, and concentrate on what should be done and what method(s) should be selected (Crossan, 2003; Wisker, 2008; Creswell, 2009).

Moreover, undertaking multi-disciplinary IS studies have been recently increased. In addition, there are many approaches, strategies, and methods for IS research on each discipline. Therefore, creating boundaries between the philosophies and conducting IS research based on a single strategy and method is difficult (Maxwell, 2008). Furthermore, cross-paradigm arguments are currently more popular than discussions within a single paradigm. Consequently, innovative research paradigms such as interpretivism and critical realism have been initiated and application of these two philosophies in IS research has dramatically increased. Moreover, as discussed earlier, multi-disciplinary IS research is mostly being conducted qualitatively. As a result, it is important to choose an appropriate research philosophy for conducting a qualitative IS study, so that these two philosophical foundations, especially critical realism are becoming more significant. In addition, as the validation of qualitative approach has always been an imperative matter, this would also be significant to validate the research findings based on the philosophical principles of an IS study.

Interpretivism is a convergence of previous philosophies like idealism, hermeneutic, pragmatism, and phenomenology. Critical realism benefits from some ideas of positivism and interpretivism. It considers social, historical, and political perspectives (Orlikowski and Baroudi, 1991; Walshaw, 1995; Myers, 1997; Light, 2003; Creswell, 2009; Mousa, 2011).

Critical realism does not believe that all reality is objectively given and humans have very limited control on it. On the other hand, it does not consider knowledge as reality

that is merely obtained through interpretation. This research concentrates on critical realism philosophy in qualitative IS research and attempts to explain and clarify the application and validation of qualitative methodology for conducting critical realist research in IS. The objectives of this study are as follows:

- Explore the principles of critical realism research philosophy and qualitative research approach in IS studies
- Offering a distinctive approach for unification of critical realism philosophy and qualitative research for conducting qualitative IS research
- Discussion and justification of validity for qualitative approach in critical realism and providing a novel strategy for the validation of qualitative IS research

The next section of this research reviews critical realism philosophy and its characteristics. Then, the research method by considering the critical realism perspectives will be discussed. Consequently, the discussion will be extended to the research approach, analysis, and validation of qualitative critical realist research. In the final section, conclusions are drawn.

2.0 Critical realism principles

We are living in an environment, which contains a number of structures and regulations that limit our options, however, through the critical realism perspective; we can address some of these limitations. During a research in IS, we can consider, evaluate, and change the limitations through our understanding and interpretation of different situations, according to the research goal. For example, a problem can be resolved by a number of means that have been practiced and approved before, commonly known as best practices in IS research. Based on the logic of critical realism, a researcher can provide a condition to modify, evaluate, and adapt the best practices for a similar problem in a different situation; and the decision is made by human through interpretation, consciousness, and volition, so that new understanding and knowledge are generated to resolve a problem. Thus, the reality is reproduced by the researcher, and it is continuously repeated by further studies. (Walsham 1995; Myers 1997; Mingers 2000; Jeppesen 2005; Morton 2006; Fox 2009; Sayer 2010; Archer et al. 2013; Simeonova 2015).

2.1 Reality in critical realism

Based on critical realism philosophy, access to reality is through knowing the reality (Mingers, 2000, 2004). According to the ontological assumption of critical realism philosophy, reality always exists, but it can be known or unknown (Sayer, 1992;

Bhaskar, 1998). Therefore, there is no reality if it does not exist. In other words, we cannot reduce the events to what have been observed or experienced, because they exist, regardless of being experienced or not. As a result, only the upper half of the figure 1 is applicable in critical realism philosophy (Jeppesen, 2005).

	Known	Unknown
Exists	Our existing knowledge	Should be investigated and be converted to knowledge
Doesn't exist	There is no reality that does not exist	

Figure 1. Dimensions of reality in critical realism perspective

Considering the best practices example, first row of this table is filled as represented in figure 2, and the task is to make unknown existents to known existents, which is reality.

	Known	Unknown
Exists	Best practices	How to achieve success based on best practices

Figure 2. An example for dimensions of reality in critical realism

Therefore, access to reality is through knowing the reality. The reality can also be natural or social; therefore, critical realism can be applied in both natural (physical) and social science. Nevertheless, knowing the reality can be achieved by conducting a journey through a stratified ontological system comprising real, actual, and empirical (Mingers, 2000, 2004; Morton, 2006) (Shown in Figure 3).

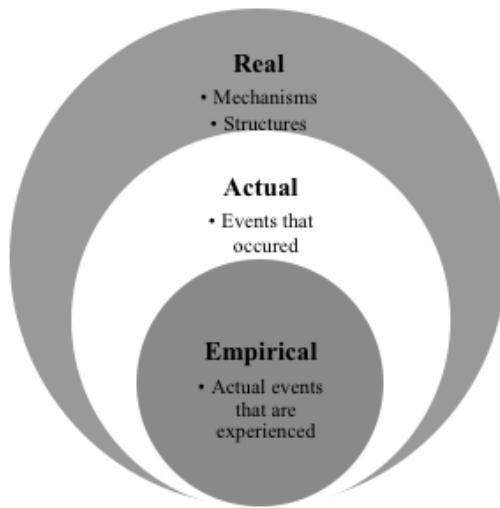


Figure 3. **Stratified domains of reality**

The real stratum includes structures, mechanisms, and events that all can be observable or non-observable. This stratum is actually the whole of reality (Mingers, 2004). However, the events in this domain may not occur. Based on critical realism epistemological principles, if the power of mechanisms and structures (regardless of being observable or not), as well as some other conditions related to the context (contextual conditions) are applied, the events occur (Wynn and Williams, 2012). These events are called ‘actual events (actuals)’, which create the actual stratum of reality. Again, these actuals can be observable, experienced, validated, or not. Based on critical realism methodological principles, the observable, experienced, and validated actuals are called ‘empiricals’, which create the empirical stratum of reality (Mingers, 2004; Wynn and Williams, 2012).

Structures

The structures are set of objects or practices, which are internally related (Sayer, 1992). Structures can be natural or social. In social or socio-technical environments, structures comprise people, teams, organisations, set of rules, practices, tools, IT, and some discursive entities, such as language and culture (Wynn and Williams, 2012). Natural structures, such as the mountains, the ocean, gravity, and so forth are independent from individuals, while social structures depend on human activities. However, it does not mean that people have flawless knowledge about the social structures (Sayer, 1992; Fox, 2009; Wynn and Williams, 2012). For example, the best practices that have been applied to solve a problem may be explicitly known by researchers and practitioners, who have identified and utilised them before. However,

a new researcher may need to identify, evaluate, understand, and perhaps modify and utilise them for different situations.

Mechanisms

Mechanisms are causal powers and tendencies that enable or limit what can happen as an outcome, by connecting correct variables within given context (Morton, 2006; Fox, 2009; Wynn and Williams, 2012).

Events

The concept of casualty in critical realism is mainly realised by understanding how the events are generated. Events are specific occurrences, which are generated by enactment of one or more mechanisms and structures. This is triggered by the human actions (Sayer, 1992; Wynn and Williams, 2012).

As a consequence, in academic research environment, if critical realism is utilised, to achieve a research outcome, the events should be created by structures and mechanisms through the research process, which is triggered by researcher's action (Mingers, 2000, 2004).

2.2 Research method

Various research methods can be applied for critical realist research. Application of fishbone diagram, which has been used by Fox (2009), creates a generic critical realism diagram and makes it more understandable, especially in IS research. According to generic critical realism diagram (Figure 4), the research creates a condition that an action conducts the researcher to the outcome. The condition is also created by mechanisms and structures.

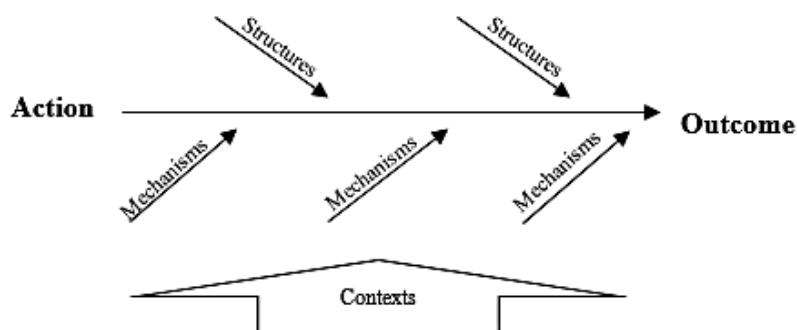


Figure 4. Critical realism fishbone diagram (adapted from Fox, 2009)

Again in best practices example, 'action' is 'adaption of best practices for a new situation'. This enhances the value of explored phenomena, improves our

understanding, and creates knowledge (Jeppesen 2005; Morton 2006; Sayer 1992; Sayer 2010). If the action occurs, the outcome would be achieved, when the mechanisms and structures are available. This is called ‘retroduction’ as a significant feature of critical realism philosophy (Fox 2009; Robson 2002; Wynn and Williams 2012). The mechanisms create the actual events, which consequently generate the outcome of the research. The structures are available and embedded within the literature and they have been identified and experienced as best practices, but they have not been experienced in the new situation. Thus, they affect the mechanisms in order to obtain or lose the outcome. They are also agreed by the researcher, but can be changed during the research (Simeonova, 2015). The hypothetical mechanisms, structures, and context for this particular example, are listed as follows. (This list is not exhaustive and is dependent on the precisely defined for individual research):

- When the problem(s) in the new situation are identified (mechanism)
- When the problem(s) in the new situation are compared with the problems in the earlier occasions (mechanism): this is called mechanism because it is a condition for creating the actual events
- A consideration of similarities and differences between new and earlier situations are available (context)
- When the problem(s) in earlier situations is (are) known and they have been addressed by available best practices (structures)

In other words, this method creates the events by mechanisms and structures. For example, when a problem in a new situation is explored and is similar to a problem in earlier circumstances, those two are compared, and then the best practices of addressing that problem in the earlier condition will be candidate to address the problem in the new situation. This process creates an event and when this is repeated for all other problems, the fishbone diagram is completed, so that the actual events are generated. Then, they will be validated by a qualitative validation process, in order to achieve empirical events. Finally, the process represented by the completed diagram leads the research to the outcome.

Applying an established research philosophy like critical realism, allows researchers to use a well-developed and well-structured path to the research. Thus, the principles and guidelines of critical realism will assist in developing the other parts of the research process, so considering the fishbone diagram, mechanisms, structures, contexts, event, and so forth would be covered in other stages of a research, including research design, data collection, analysis, and validation (Maxwell, 2008).

3.0 A qualitative approach to critical realist IS research

Based on the critical realism perspectives, different types of knowledge objects exist and they have various characteristics. Thus, according to those characteristics, different research strategies and approaches can be applied to access mechanisms and structures that lead IS research to the outcome. However, the critical realism does not obligate the researcher to utilise only a particular approach and strategy in the research (Alvesson and Sköldberg 2009; Fox 2009; Given 2008). In other words, Roy Bhaskar (originator of the critical realism philosophy) has never recommended a particular research methodology for any critical realist research (Wynn and Williams, 2012). Critical realism is a heterogeneous philosophy that clarifies the way to move from ‘action’ to ‘outcome’ and assists the researcher in selecting a strategy and method for study based on a research question and its characteristics (Alvesson and Sköldberg 2009; Mingers et al. 2013; Scott 2007; Zachariadis et al. 2013).

Myers (1997) pointed out that selection of research approach is independent of research philosophy. Therefore, qualitative research can be positivist, interpretivist, or critical realist. Nonetheless, currently, critical realist researchers have attempted to provide maximum alignment between their research approach and their philosophy.

A variety of critical realism researches employ case study strategy and perform the inquiries through a qualitative approach, mainly interviews (Easton 2010; Myers 1997). For instance, Fox (2009) has involved one case study for his research in IS based on critical realism philosophy. Then, he has employed literature review, semi-structured interviews, and workshops to gather in-depth knowledge for the mechanisms and structures. On top, Easton (2010) believes that case study is a qualitative approach and completely conforms with critical realism philosophy, which is also well suited for investigating complex events in IS research subjects, such as inter-organisational relationships and flow of information amongst them. Similarly, O’Gorman (2013) has designed his IS research with a single case study based on critical realism perspectives. He has commenced his research with a comprehensive literature review and then utilised a qualitative approach to achieve the research outcome.

Traditionally, statistical approaches are not being utilised by critical realists, because these approaches work in a closed manner and try to provide certainty for the knowledge and this is against the critical realism philosophy, which believes we can

never know the knowledge, for certain (Bhaskar 1998; Olsen and Morgan 2005). However, recently, mixed approaches are being applied by IS researchers (such as McEvoy 2006; Zachariadis et al. 2013; Simeonova 2015). They mostly utilise the quantitative part for investigating the validity and generalizability of their mechanisms and structures, in order to move from actual to empirical stratum (see figure 3). In addition, McEvoy (2006) has carried out a quantitative study, and has provided a deeper understanding of the knowledge by employing a qualitative research based on critical realism perspective. Moreover, Zachariadis et al. (2013) believes that the retrodiction should be repeatedly carried out between literature review, quantitative and qualitative research. Yet, the role of qualitative approach is more prominent, because it is more capable of providing in-depth understanding of phenomena, identifying the complex mechanisms, creating relationship between different mechanisms as well as between mechanisms and structures, and describing the actual events (Mingers et al. 2013). Furthermore, qualitative research is suited for exploratory and complex research, because it is more capable of explaining the complexities (Given, 2008). Besides, in qualitative approach the researchers utilise their interpretation to the mechanisms and events that is required by critical realism philosophy (Scott, 2007). Therefore, the marriage of qualitative approach and critical realism provides an adequate conceptualisation and rigorous description of the research (Maxwell 2004).

4.0 Validation of qualitative critical realist research on IS

To discuss validity of qualitative research, it should be firstly understood that validation of qualitative research is different from validity in quantitative study.

4.1 Validity in qualitative research

In the recent years the need for deeply understanding of phenomena, especially in multi-disciplinary research have been increased. Consequently, the use of qualitative research method has been raised. Therefore, ‘understanding’ in qualitative research is more important than validity. In addition, data or methods are not valid or invalid by themselves, but the inferences and circumstances that are drawn from data through those methods, make validity or invalidity for a qualitative study (Maxwell 1992).

However, validation of qualitative data and outcome(s) is being argued by researchers in the recent decades.

Validity, reliability, and generalisability are three principles that are usually discussed and assessed by the researchers, in order to answer the important question of ‘why we should rely upon the research outcome and apply it to overcome our issues?’ However, these terms (especially generalisability and reliability), are mainly used in quantitative research, and application of them for qualitative research has been argued by the earlier researchers (such as Lincoln and Guba 1985; Patton 1990; Maxwell 1992; Stenbacka 2001; Whittemore et al., 2001; Fossey et al. 2002; Pyett 2003; Shenton 2003; Golafshani 2003; House 2005; Morrow 2005). For instance, as pointed out by Stenbacka (2001), these terms are not only irrelevant, but also cause inappropriateness for qualitative research. Moreover, Golafshani (2003) believes that the terms validity and reliability are not appropriate in qualitative research and they should be redefined. Regarding generalisability, Hoepfl (1997) has argued that we do not generalise in qualitative research, we rather ‘extrapolate’ the outcome. This idea has also been confirmed by Golafshani (2003). She has also explained that generalisability can be achieved by providing quality for the qualitative research. The quality is also attained by verification of reliability and validity in qualitative research. Moreover, without validity there would not be any reliability (Lincoln and Guba 1985; Patton 1990). Thus, validity is the main principle that should be assessed in qualitative study.

Earlier researchers have also provided a number of criteria for validating the research with different terminologies (Table 1). However, there is no single criteria or set of techniques for all qualitative studies, and it all depends on purpose and circumstances of the research. In addition, the weight of each criterion is different per study (Marshall 1989; Maxwell 1992; Whittemore et al. 2001).

Contributor	Validity Criteria
Thorne (1997)	Methodological integrity, representative credibility, analytic logic, interpretive authority
Maxwell (1992, 1996)	Descriptive validity, interpretive validity, theoretical validity, evaluative validity, generalizability
Lincoln (1995)	Positionality, community as arbiter, voice, critical subjectivity, reciprocity, sacredness, sharing perquisites of privilege
Altheide and Johnson (1994)	Plausibility, relevance, credibility, importance of topic
Leininger (1994)	Credibility, confirmability, meaning in context, recurrent

	patterning, saturation, transferability
Sandelowski (1986, 1993)	Credibility, fittingness, auditability, confirmability, creativity, artfulness
Eisenhart and Howe (1992)	Completeness, appropriateness, comprehensiveness, credibility, significance
Marshall (1990)	Goodness, canons of evidence
Smith (1990)	Moral and ethical component
Lincoln and Guba (1985); Guba and Lincoln (1989)	Truth value, applicability, consistency, neutrality

Table 1. Some validity criteria for qualitative research

Hence, validity should be assessed by qualitative researchers, but with a different translation, such as rigour, trustworthiness, authenticity, goodness, or quality of qualitative research. Nevertheless, Whittemore et al. (2001) pointed out that these translations have not been irresistibly supported by the researchers. Thus, he believes that the translation is not required, because the term validity provides instantaneous understanding of the purpose. However, it should be defined differently. Thus, validity, reliability, and generalisability of qualitative research are definitely achievable. Nonetheless, the definitions of these principles, their typology, and the procedure of their assessment for qualitative research are significant (Kirk and Miller 1985; Maxwell 1992). For instance, some researchers (such as Golafshani 2003; Patton 1990; Pyett 2003) defined them as ‘credibility’ of the research that should be verified during the research. However, in contrast with the quantitative researchers, who use various statistical tools, qualitative researchers are themselves the tools/instruments and they should equip the research outcome with credibility, during the research, especially through data collection and analysis phases.

Thus, the validity as the main principle includes reliability and generalisability of the study that should not be misunderstood by its meaning in quantitative research. In other words, it should be understood with a different definition or interpretation (not translation), and as explained and implemented by former researchers, the terms rigour, trustworthiness, credibility, authenticity, goodness, quality, and so forth, help the researcher for this interpretation (Hansen 1995; Connell et al. 2001; Mousa 2011; Feldman et al. 2015). Hence, the researchers use some techniques and strategies for validation. For instance, triangulation is the most important method for testing the validity of qualitative study (Golafshani 2003). Respondent validation is also another technique for validation in qualitative research (Silverman, 2013). Some researchers

have also combined various techniques to provide an optimum validation for the qualitative research. For example, Feldman et al. (2015) has utilised a combination of triangulation and respondent validation for validation of his qualitative research.

Maxwell (2012) has brought the most important strategies together and provided a checklist for testing the validity in qualitative research. His checklist comprises the strategies as follows:

- Intensive: long term involvement
- Rich data
- Respondent validation
- Intervention
- Searching for discrepant evidence and negative cases
- Triangulation
- Numbers
- Comparison

Nonetheless, he has emphasised that not every strategy will work in a given research, and trying to apply all of them, which are feasible for that particular study might not be efficient. Thus, as discussed previously, it depends on purpose and circumstances, as well as addressing the most serious and plausible validity threats of a particular study.

4.2 Qualitative validation of critical realist IS research

In critical realist IS research the empirical aspect of mechanisms, structures, and events should be postulated. However, as discussed earlier, Roy Bhaskar has never pointed out that the empirical aspect for the results has to be provided by quantitative approach (Wynn and Williams, 2012). Thus, the critical realism philosophy does not obligate the validation to be quantitative. In addition, Myers (1997) believed that each technique in qualitative research collects empirical data. He also used the term ‘empirical material’ rather than ‘empirical data’, as qualitative data is non-numeric. Moreover, based on critical realism belief, the observation of mechanisms is rarely achievable by people. Thus, the existence of reality cannot be denied, because it is not observable, but if it is observed, we would be more confident. In addition, we may not be able to observe and measure them at the present time, but the observability may be provided by innovative approaches, tools, and further research in the future (Sayer 2000; Wynn and Williams 2012; Bhaskar 2013).

The main objective of validation in critical realism IS research is to show that the actual events are capable of leading action to the outcome. Wynn and Williams (2012)

have proposed five methodological principles for evaluation of this capability, as well as conducting their critical realism research. Those principles are explication of events, explication of structure and context, retrodiction, empirical corroboration, and triangulation (Figure 5).

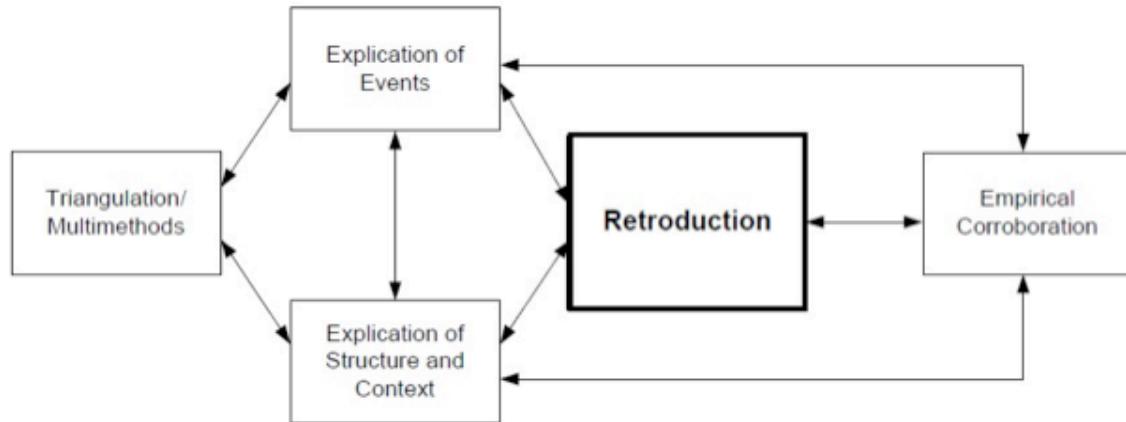


Figure 5. The principles of evaluation and conducting critical realism research (Wynn and Williams 2012)

Retrodiction, which is key in critical realism research, has already been comprehensively described in previous sections. Accordingly, the events, structure, and context were also explicated. There are two more principles of ‘empirical corroboration’ and ‘triangulation’ that have to be met to achieve an empirical aspect of critical realism, and address the validity of the research. Empirical corroboration seeks to validate the inferences generated through retrodiction. Triangulation is accomplished by collecting information from a diverse range of individuals, data types, sources, and settings, using a variety of methods and techniques (Maxwell, 2012; Wynn and Williams, 2012). These two principles are related to each other and triangulation is sometimes required for empirical corroboration. Therefore, Maxwell’s checklist needs to be extended to incorporate ‘empirical corroboration’, ‘retrodiction’, and ‘explication of events, structures, and context’, as ‘triangulation’ already exists (Figure 6). The explication of events, structures, and context was also considered within retrodiction strategy.

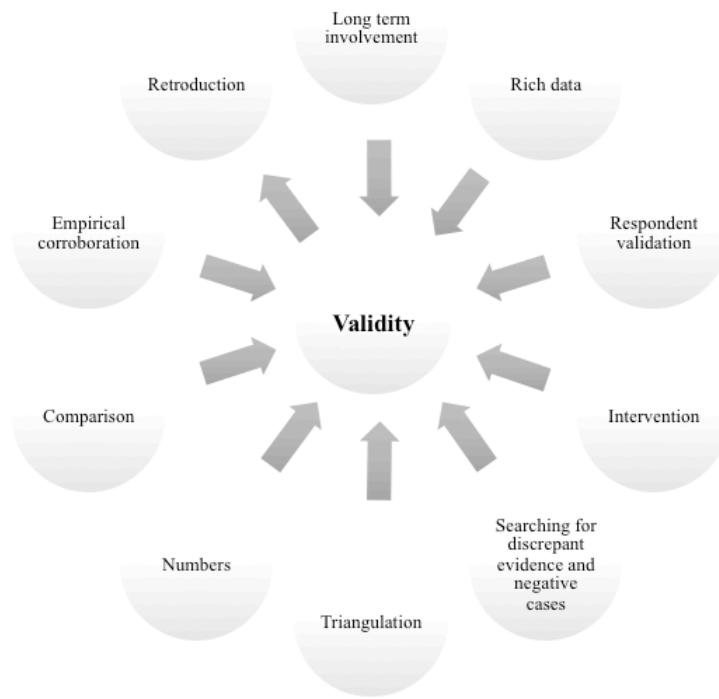


Figure 6. The possible strategies for validation of this research

Previously published studies are not consistent in specifying the best strategy for validation of qualitative research. Thus, it is necessary to decide which validity threats are the most probable ones and then select the most suitable strategy and criteria for validation (Maxwell, 2012b).

5.0 Conclusions

While most of the critical realist studies utilises quantitative or mixed approach for their research, this study explained that how a qualitative approach can meet the requirements of critical realism philosophy in IS research. In this research, firstly, critical realism philosophy and its characteristics, especially in IS research, were reviewed. Secondly, the literature regarding qualitative approach in conducting IS research was reassessed. Then, the impact of critical realism on different aspects of qualitative research was discussed. Finally, the alignment of critical realism with qualitative methodology was rationalised. Hence, the innovative methodology provided by this research justified that qualitative research can be carried out to meet critical realism requirements in IS research. Thus, this study explained a distinctive qualitative methodology for conducting critical realist research on IS.

Based on this method, IS research is mapped into a critical realism fishbone diagram, so that mechanisms and structures can be identified by conducting qualitative research, in order to lead ‘action’ to ‘outcome’. This also informs all other aspects of IS research, including method(s), analysis, and validation of the research.

Moreover, this research offered a novel strategy for the validation of qualitative research by combining ‘Maxwell’s qualitative validity criteria’ with ‘Wynn & Williams’s methodological principles of evaluating the capabilities of actual events to lead action to the outcome in critical realist research’ to address the validity of the research. Accordingly, the study critically analysed the checklists for validation of qualitative research and integrated them with validation principles in critical realist IS research. In addition, it explains how to identify the possible criteria for validation of critical realist qualitative research on IS. Thus, the study showed that different sets of validation criteria have to be assessed based on characteristics and requirements of each research and there is no single checklist for all IS research.

References

- Alvesson M and Sköldberg K (2009) *Reflexive Methodology: New Vistas for Qualitative Research*. London, California, New Delhi: SAGE Publications.
- Bhaskar R (1998) *The Possibility of Naturalism: A Philosophical Critique of the Contemporary Human Sciences (Critical Realism--Interventions)*. Routledge.
- Bhaskar R (2013) *A Realist Theory of Science*. Oxon, New York: Routledge.
- Bowen GA (2009) Document Analysis as a Qualitative Research Method. *Qualitative Research Journal*, Emerald Group Publishing Limited, 9(2), 27–40, Available from: <http://www.emeraldinsight.com/doi/abs/10.3316/QRJ0902027> (accessed 6 April 2017).
- Connell J, Lynch C and Waring P (2001) Constraints, Compromises and Choice: Comparing Three Qualitative Research Studies. *The Qualitative Report*, Available from: <http://nsuworks.nova.edu/tqr/vol6/iss4/1> (accessed 25 October 2017).
- Creswell JW (2009) *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Los Angeles, London, New Delhi, Singapore: SAGE Publications.
- Easton G (2010) Critical realism in case study research. *Industrial Marketing Management*, 39(1), 118–128, Available from:

<http://www.sciencedirect.com/science/article/pii/S0019850109001424> (accessed 9 July 2017).

Feldman G, Shah H, Chapman C, et al. (2015) Enterprise Systems Upgrade Drivers: A Technological, Organisational and Environmental Perspective. *PACIS 2015 Proceedings*, Available from: <http://aisel.aisnet.org/pacis2015/83> (accessed 23 October 2017).

Fossey E, Harvey C, McDermott F, et al. (2002) Understanding and evaluating qualitative research. *Australian and New Zealand Journal of Psychiatry*, Taylor & Francis, 36(6), 717–732, Available from: <http://www.tandfonline.com/doi/abs/10.1046/j.1440-1614.2002.01100.x#.VcyEsflVhBc> (accessed 13 August 2017).

Fox S (2009) Applying critical realism to information and communication technologies: a case study. *Construction Management and Economics*, Taylor & Francis, Available from: <http://www.tandfonline.com/doi/full/10.1080/01446190902842292> (accessed 7 August 2017).

Given LM (2008) Critical Realism. In: *The SAGE Encyclopedia of Qualitative Research Methods*, SAGE Publications, p. 1072.

Golafshani N (2003) Understanding Reliability and Validity in Qualitative Research. *The Qualitative Report*, Available from: <http://nsuworks.nova.edu/tqr/vol8/iss4/6> (accessed 19 August 2017).

Hancock B (2001) *An introduction to qualitative research*. Nottingham: Trent Focus Group.

Hansen RE (1995) Teacher Socialization in Technological Education. Digital Library and Archives of the Virginia Tech University Libraries, Available from: <http://scholar.lib.vt.edu/ejournals/JTE/v6n2/rhansen.jte-v6n2.html> (accessed 25 October 2017).

Hoepfl MC (1997) Choosing Qualitative Research: A Primer for Technology Education Researchers. *Journal of Technology Education*, Digital Library and Archives of the Virginia Tech University Libraries, 9(1), 47–63, Available from: <http://scholar.lib.vt.edu/ejournals/JTE/v9n1/hoepfl.html> (accessed 19 August 2017).

Jeppesen S (2005) *Critical Realism as an Approach to Unfolding Empirical Findings : Thoughts on Fieldwork in South Africa on SMEs and Environment*.

- Lincoln Y and Guba EG (1985) *Naturalistic inquiry*. Beverly Hills Calif.: Sage Publications.
- Marshall C (1989) Goodness Criteria: Are They Objective Criteria or Judgment Calls?. In: *the Alternative Paradigms Conference*, San Francisco, Available from: <http://eric.ed.gov/?id=ED318080> (accessed 20 August 2017).
- Maxwell J (1992) Understanding and Validity in Qualitative Research. *Harvard Educational Review*, Harvard Education Publishing Group, 62(3), 279–301, Available from: <http://hepgjournals.org/doi/abs/10.17763/haer.62.3.8323320856251826> (accessed 3 June 2017).
- Maxwell JA (2004) Using Qualitative Methods for Causal Explanation. *Field Methods*, 16(3), 243–264, Available from: <http://fmx.sagepub.com/content/16/3/243.abstract> (accessed 22 September 2017).
- Maxwell JA (2008) Designing a qualitative study. In: *The SAGE Handbook of Applied Social Research Methods*, Los Angeles, London, New Delhi, Singapore, Washington DC: SAGE Publications, pp. 214–253, Available from: http://www.sagepub.com/sites/default/files/upm-binaries/23772_Ch7.pdf (accessed 17 October 2017).
- Maxwell JA (2012a) *Qualitative Research Design: An Interactive Approach*. Los Angeles, London, New Delhi, Singapore, Washington DC: SAGE Publications.
- Maxwell JA (2012b) *Qualitative Research Design: An Interactive Approach*. SAGE Publications.
- McEvoy P (2006) A critical realist rationale for using a combination of quantitative and qualitative methods. *Journal of Research in Nursing*, 11(1), 66–78, Available from: <http://jrn.sagepub.com/content/11/1/66.short> (accessed 20 September 2017).
- Mingers J (2000) The contribution of critical realism as an underpinning philosophy for OR/MS and systems. *Journal of the Operational Research Society*, Nature Publishing Group, 51(11), 1256–1270, Available from: <http://www.palgrave-journals.com/jors/journal/v51/n11/abs/2601033a.html> (accessed 4 August 2017).
- Mingers J (2004) Real-izing information systems: Critical realism as an underpinning philosophy for information systems. *Information and Organization*, 14(2), 87–103.
- Mingers J, Mutch A and Willcocks LP (2013) Critical realism in information systems

- research. *MIS Quarterly: Management Information Systems*, Management Information Systems Research Center, Available from: <http://eprints.lse.ac.uk/55184/> (accessed 17 October 2017).
- Morton P (2006) Using Critical Realism to Explain Strategic Information Systems Planning. *Journal of Information Technology Theory and Application (JITTA)*, Available from: <http://aisel.aisnet.org/jitta/vol8/iss1/3> (accessed 18 October 2017).
- Mousa R (2011) E-government adoption process : XBRL adoption in HM revenue and customs and companies house. Accounting and Finance Department, Birmingham Business School, Available from: <http://etheses.bham.ac.uk/1752/> (accessed 3 August 2017).
- Myers M (1997) Qualitative Research in Information Systems. *MIS Quarterly*, 21(2), 241–242.
- O’Gorman C (2013) *A Critical Realist study of Dynamic Capabilities in SMEs*. Available from: http://scholar.googleusercontent.com/scholar?q=cache:2VI9jwWPPukJ:scholar.google.com/&hl=en&as_sdt=0,5 (accessed 17 October 2017).
- Olsen W and Morgan J (2005) A Critical Epistemology of Analytical Statistics: Addressing the Sceptical Realist. *Journal for the Theory of Social Behaviour*, 35(3), 255–284, Available from: <http://doi.wiley.com/10.1111/j.1468-5914.2005.00279.x> (accessed 20 October 2017).
- Patton MQ (1990) *Qualitative evaluation and research methods* (2nd ed.). Thousand Oaks, CA, US.
- Pyett PM (2003) Validation of Qualitative Research in the ‘Real World’. *Qualitative Health Research*, 13(8), 1170–1179, Available from: <http://qhr.sagepub.com/content/13/8/1170.short> (accessed 6 June 2017).
- Robson C (2002) *Real World Research: A Resource for Social Scientists and Practitioner-Researchers*. Wiley, Available from: https://books.google.co.uk/books/about/Real_World_Research.html?id=DkplMcAysFQC&pgis=1 (accessed 15 October 2017).
- Sayer A (1992) *Method in Social Science: A Realist Approach*. Psychology Press.
- Sayer A (2000) *Realism and Social Science*. London, California, New Delhi: SAGE Publications, Available from: <http://sociology.sunimc.net/htmledit/uploadfile/system/20110526/201105260054>

07301.pdf (accessed 2 November 2017).

Scott D (2007) Resolving the quantitative–qualitative dilemma: a critical realist approach. *International Journal of Research & Method in Education*, Routledge, 30(1), 3–17, Available from:

<http://www.tandfonline.com/doi/abs/10.1080/17437270701207694> (accessed 22 October 2017).

Silverman D (2013) *Doing Qualitative Research: A Practical Handbook*. Los Angeles, London, New Delhi, Singapore, Washington DC: SAGE Publications.

Simeonova B (2015) Knowledge Sharing and Knowledge Interaction Processes within Bulgarian Firms. Royal Holloway, University of London, Available from: [https://pure.royalholloway.ac.uk/portal/en/publications/knowledge-sharing-and-knowledge-interaction-processes-within-bulgarian-firms\(0b823f66-3bf4-495c-8a39-64464df714f3\)/export.html](https://pure.royalholloway.ac.uk/portal/en/publications/knowledge-sharing-and-knowledge-interaction-processes-within-bulgarian-firms(0b823f66-3bf4-495c-8a39-64464df714f3)/export.html).

Stenbacka C (2001) Qualitative research requires quality concepts of its own. *Management Decision*, MCB UP Ltd, 39(7), 551–556, Available from: <http://www.emeraldinsight.com/doi/full/10.1108/EUM0000000005801> (accessed 19 August 2017).

Tashakkori A and Teddlie C (2010) *SAGE Handbook of Mixed Methods in Social & Behavioral Research*. California, New Delhi, London, Singapore: SAGE Publications.

Whittemore R, Chase SK and Mandle CL (2001) Validity in Qualitative Research. *Qualitative Health Research*, 11(4), 522–537, Available from: <http://qhr.sagepub.com/content/11/4/522.short> (accessed 14 June 2017).

Wisker G (2008) *The Postgraduate Research Handbook: Succeed with your MA, MPhil, EdD and PhD*. Palgrave McMillan, Hampshire, New York.

Wynn D and Williams CK (2012) Principles for conducting critical realist case study research in information systems. *MIS Quarterly*, Society for Information Management and The Management Information Systems Research Center, 36(3), 787–810, Available from: <http://dl.acm.org/citation.cfm?id=2481655.2481663> (accessed 21 October 2017).

Zachariadis M, Scott S and Barrett M (2013) Methodological Implications of Critical Realism for Mixed-Methods Research. *Mis Quarterly*, The Management Information Systems Research Center (MISRC), Available from: <http://dialnet.unirioja.es/servlet/articulo?codigo=4330287> (accessed 20 October

2017).