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Critical Realism: What you should know and How to apply it.

Purpose: The purpose of this paper is to discuss critical realism philosophical viewpoint and how it can be applied in qualitative research. Critical realism (CR) is a relatively new and viable philosophical paradigm proposed as an alternative to the more predominant paradigms of positivism, interpretivism and pragmatism. This paper reviews the concept, its benefits and limitation. It goes further to provide an example of how CR is used as a philosophical and methodological framework with Systems Thinking (ST) theory to applied qualitative research.

Design/methodology/approach: A study of project management challenges in a Nigerian Government Organisation (NGO) is used to demonstrate a qualitative research approach which includes a coding process and data analysis that is consistent with CR ontology and epistemology.

Findings: Critical Realism focuses primarily on closed systems. However, a more accurate explanation of reality is obtained in addition to the identification of contextual causal mechanisms in the context of study when a general systems theory is applied.

Research limitations/implications: The knowledge about the nature of relationships obtained in the context of study may not necessarily be replicated in another context. However, this paper elucidates a CR process that is generalisable by demonstrating how a theory is applied in a different context.

Originality: The paper demonstrates how systems theory is used to understand interactions in critical realism paradigm. It engages with CR approach critically and illustrates a clear example of how CR can be applied in social research.

Keywords: critical realism, systems thinking, data analysis, case study
Introduction

Critical realism is an all-inclusive philosophy of science because it uses both the positivist and constructivist approaches to provide a thorough account of ontology and epistemology (Gorski, 2013; Fleetwood et al., 2002). This method seeks to measure the underlying causal relationships between social events to acquire a better understanding of issues and thus being able to suggest strategic recommendations to address social problems (Fletcher, 2017).

Since Pragmatism and CR both advocate for the need to mix methods, these two have been associated together (Sayer in Easton, 2010; Lipscomb, 2011). However, pragmatism argues that ontological and epistemological dimensions can be separated out from the methods and strategies applied in a study thus promoting the notion that the ‘end justifies the means’ (Scott, 2007; Johnson and Onwuegbuzie, 2004). On the other hand, CR associates with ontological and epistemological assumptions by arguing that an external reality exists both in natural and social science, the exception is the character of reality in the latter which is adapted to reflect the particular nature of the social environment (Gorski, 2013). It maintains that dimensions of reality are deep-seated and cannot be reduced to experimental observations, but rather can be known by understanding the mechanisms that produce those experimental events which are hardly ever directly visible (Danermark et al., 2001).

In CR, the primary reason for mixing qualitative and quantitative approaches is to promote understanding of the reasons for the complexity of the reality and not to translate it (Sobh and Perry, 2006). That is, CR asserts that qualitative methods are used in obtaining rich explanations of existing mechanisms in the phenomenon of interest (Bhaskar, 1998) and if a better understanding of the situation is required in order to redirect and change these mechanisms, then testing the nature and strength of existing mechanisms can be achieved by quantitative means (Edwards et al., 2014). Scholars have advocated the potential CR has in achieving thought-provoking and insightful research (Karlsson and Ackroyd, 2014; Bhaskar, 2014). However, the scarcity of literature focusing on the application of CR, justifies the need for further awareness and development on the application of CR in empirical qualitative studies (Mingers, 2014).

In this article, the application of CR in qualitative research is discussed. The aim of the study is to engage with CR approach critically, illustrate a clear example on how CR can be applied in social research while simultaneously gaining insight to contextual causal mechanisms that impact on the application of project management in a Nigerian government organisation by using Systems Thinking Theory.

The study involved 17 in-depth interviews with Project Managers to examine how the application of project management is impacted upon and how they respond to the challenges of poor project management practices. Some background to CR is first presented and then assessed against corresponding philosophical positions. Next, the relevance of applying CR to project management
research is discussed. Thematic data analysis which is consistent with CR ontology and epistemology (Fletcher, 2017) is used to deduce key and sub themes. The process of analysis in CR, Retroduction, is elucidated. This process involved the explanation of significant characteristics of causal relationship using systems thinking to arrive at a theoretical explanation or re-description (Mingers, 2006; Bhaskar 1998) which ultimately led to the identification of causal mechanisms driving current trends in project management development in a Nigerian government organisation (NGO). Systems Thinking consists of several schools of thoughts with varying views (Ababneh et al., 2009). The focus here is on the General Systems Theory perspective.

Overview of Critical Realism (CR)

Developed by Bhaskar in the 70s and 80s, CR is a philosophical system which has progressed by other scholars and is positioned as an alternative to positivism and interpretivism paradigms (Archer et al., 2013; Bhaskar, 2013). It leverages aspects of both to offer new approaches to developing knowledge by recognising the role of subjective information of social actors in a given context while taking note of the independent structures that constrain and facilitate these actors to carry out certain activities in that context (Sayer, 2010). In the same vein, CR is regarded as a philosophy about social structures and human agency, and their interaction is used as a basis for the analysis of complex phenomenon for theorising the relative interplay of structures, culture and agency (Hjørland and Wikgren, 2005). Despite the assertion of the methodological underdevelopment of its application (Yeung, 1997), CR provides researchers with novel opportunities to explore/investigate complex organisational occurrences in a holistic way (Easton, 2010).

Bhaskar’s (1998) criticisms of positivism and constructivist philosophies led to the emergence of CR. He refuted that reality is not exclusively about what is empirically known and argued that the nature of the world is not reducible to our knowledge of reality, therefore it is not possible to make inference, as in natural science, through the use of experiments. In response to the constructivists, he contended reality is not entirely constructed through the knowledge or discourse of the social actors (Bhaskar, 1998) and advocated that reality independent of our conception and knowledge of it exists, but this is not accessible to direct observation. CR suggests that our knowledge of the external world consists of subjective interpretations and is fallible because they are formed by the conceptual frameworks in which the researcher operates (Mcevoy and Richards, 2003; Bhaskar, 1998).

For a critical realist, reality has causal powers and mechanisms, which can be experienced by their ability to cause or make things to occur (Danermark et al., 2002). Therefore, the ability to participate in causal
analysis in a given context makes CR valuable for analysing social problems and proffering solutions (Fletcher, 2017). Table 1 shows the differences between CR and major philosophical positions based on their assumptions.

**Ontological and Epistemology of CR**

Ontologically, CR assumes that reality is multi-layered or stratified into three domains: The Real, the Actual and the Empirical. The domain of the Real consists of deep structures of objects or entities which are physical, social and internally related. The Real contains total reality; the mechanisms, events, experiences and causal powers inherent to these objects or entities as they independently exist. The domain of the Actual consists of events that takes place when causal powers of structures and objects are enacted, in spite of whether they are observable or not. Lastly, the domain of the Empirical are those events that are experienced or observable through perception or measurement (Archer et al., 2013). These domains are nested within each other such that it is impractical to reduce what causes an event in one level to another level because at each level some new experience emerges (Hjørland and Wikgren, 2005).

Epistemologically, CR conceives a description of the real world through an analysis of the experiences of participants. Consequently, there is a hermeneutic aspect involved in carrying out investigations. The knowledge claims that results from the analysis are aimed at identifying and explaining those elements of reality which must exist for the events and experiences being investigated to have taken place (Wynn and Williams, 2012). Therefore, the epistemological objective of CR is to describe and clarify the relationship between observed experiences, events and mechanisms. For critical realists, the main objective of the investigation is to acquire knowledge about underlying causal mechanisms in order to achieve an explanation of how things work.

A stratified ontology is the core of Critical Realism (Bygstad and Munkvold, 2011). All levels are part of the same environment or reality and are represented as three overlapping or nested domains (Archer et al., 2013; Mingers 2006). The primary objective of CR is to explain a social occurrence by referencing causal mechanisms and the potential consequences they have throughout the stratified 3-layers of reality (Fletcher, 2017).
Background to Project Management challenges in NGO study

The practice of project management is recognised as a significant contributor to the successful delivery of projects (Basheka and Tumutegyereize, 2012). Due to the quest for government reforms by western federations (Baranskaya, 2007; Crawford et al., 2003), the use of project management techniques to control government expenditure and promote efficiency in project and service delivery became increasingly popular. Consequentially, accountability and administrative effectiveness are relatively improved through the utilisation of developmental projects in these organisations (Olusola et al., 2012).

Interest in project management practice (PMP) has a long history in developed societies, while its prospects remain unexploited in developing nations. In most developed countries, the effective utilisation of project management helps to promote and drive the values of government public projects. However, in developing Sub-Saharan Countries, vital information required to build project management practices within the public sector is still lacking, despite the recognition of some challenges posited to be institutional, structural and cultural (Shuaib, 2016; Zuofa and Ochieng, 2014).

By employing the use of CR with a Systems Thinking approach, this study argues that that the conventional explanation of the reason for poor project management practice in Sub-Saharan region does not address the reality of the condition from a holistic perspective, but instead offers a partial investigation. The author draws from Engwall’s (2003) assertion that projects are essentially open systems that consist of many contextual inter-related dependencies and variances. Hence, the reductionist, rational approach applied in explaining these challenges is inadequate in analysing complex environments and does not support an understanding of contextual characteristics relevant for specific accounts and the development of project management (Lawani and Moore, 2016).

Critical realism argues that ontologically, there exist elements that cannot be directly observed or identified objectively, but which cause or are responsible for the effect we see (Mcevoy and Richard, 2003). This implies there are a number of elements and interacting mechanisms in Nigerian Government Organisations (NGO), each of which can impact on the existing state of affairs and generate events which result in the deficiencies of project management practices.

Systems Thinking theory

Systems Thinking (ST) is widely recognised as a useful theory in explaining complex problems that are not easily deciphered using reductionist thinking. It has its foundation in General Systems Theory, first proposed by Bertalanffy, and comprises a set of concepts and models that relates to systemic structures or behaviours (Rousseau, 2015). Systems thinking has been defined and advanced in various ways, with
many having a different focus or viewpoint, which often leads to confusion (Arnold and Wade 2015). Some of the techniques and approaches developed for different situations in different disciplines include systems dynamics (Senge, 1997), critical systems (Jackson, 2001) and soft systems methodology (Checkland, 1981). In categorising the approaches, there have been variations too, Reynolds and Holwell (2010) identified 19 ST methods and Ababneh’s et al., (2009) graphical representation shows 14 ST approaches.

The disparate interpretations and approaches make it inappropriate to include all aspects of systems under the term systems thinking, and the scope of this study does not include an evaluation of systems thinking methods. For present purposes, the General Systems Theory (GST) was used as a guiding theory in the application of CR.

GST supports the common themes that have emerged from reviews of various academic literature which acknowledge that systems are dynamic, are constantly influenced by multiple forces and feedback mechanisms. There is consensus that ST is a perspective, a language and a set of tools (Monat and Gannon, 2015). The mutual perspective recognises that in natural and human designed systems, events and/or patterns that are repeated originate from systemic structures which, in turn, originate from mental models or physical/chemical forces. This perspective is a core element of systems thinking and is often depicted by the iceberg model (Kim, 1999; Sheffield et al., 2012).

The Iceberg model is a conventional and well recognised systems thinking tool designed to assist in providing a holistic view by discovering patterns of behaviour, supporting structures and mental models underlying a specific event or phenomenon. The model suggests that events or experiences, which are the issues easily seen, are traceable to a ‘history’ of past activities or behaviours which presents a pattern caused by systemic structures and mental models that are often invisible (Maani and Cavana, 2007).

The philosophy of critical realism and systems thinking approach both argue against reductionism. However, the difference between the views of system theorists and critical realists lies in the definition of openness and closure such that the latter explains them in terms of the structure of the system while the former focuses on its manifestation or outcome (Chick and Dow, 2005). Advocates of CR opine that factors capable of influencing a system must be internalised within the system.
Methodology and Method: Applying CR to study Project Management in NGO

Various scholars have applied different methodological principles in critical realism research such as explanation of events (Morton, 2006) and explanation of structure and context (Bygstad, 2010). Each of the methodological principles highlights or emphasises a consistent strand; a clear/open focus on establishing causality. Each methodological principle searches for an explanation of how and why a certain phenomenon occurs in relation to a particular context. The search for these explanations is typically achieved through qualitative means.

Retroduction is the fundamental method of inference used in arriving at a theoretical explanation by describing significant characteristics of a possible causal structure at work (Bhaskar, 1998). Some authors have referred to this process as abduction (Mingers, 2006; Mcevoy and Richards, 2003), thereby introducing ambiguity between the two terms. However, while abduction is often only associated with a theoretical re-description of apparent events, Retroduction, is more overarching as it involves two processes – (1) Carrying out a theoretical re-description of the observable elements (ideally provided by research participants or historical data) by integrating observations with concepts identified from the literature, and (2) Identifying the interplay of elements, i.e. mechanisms. This process seeks to establish interconnectedness of the events as they are observed (Danemark et al., 2002). Therefore, arguably, abduction is a subset of Retroduction, and the different methodological principles used in critical realism (explanation of events and explanation of structure and context) are essentially variant forms of Retroduction.

In this study, four systems within project-based organisations were investigated - governance system, management system, project delivery system and project management system. This is congruent with the four nested governance and management systems that have separate yet interconnecting roles of enhancing strategy, operational and administrative activities to optimise the management of projects (Too and Weaver, 2014). Research of the four systems is also consistent with theoretical models of systems thinking theory that are used in demonstrating the dynamic behaviour of a system (Maani and Cavana, 2007).

Method

Critical realism employs either an intensive or extensive method. The former focusing on the discovery of causal powers (generative mechanisms) and the latter focusing on the broader context in which the mechanisms operate (Edwards et al., 2014). Since an in-depth diagnosis of the current situation is
required rather than the magnitude of the problem, an intensive approach was adopted involving a case study. Moreover, the extensive method has been argued to be associated with quantitative data collection and statistical analysis (Danermark et al., 2002).

The first stage of data collection was a comprehensive literature review on the widespread trends of barriers to project management development in Nigeria. The relevance of this process was to establish patterns and define a problem or question, which is theory-driven. An intensive data collection stage involved semi-structured interviews undertaken with 17 experienced project managers from a government organisation having the mandate to execute construction building projects in Nigeria. A semi-structured interview format was used to ensure flexibility in exploring and updating existing literature on project management challenges while still allowing new thoughts to emerge.

Data from the interviews were transcribed and cleaned before importation to NVivo for data management. A considerable amount of time was spent during the data collection process and transcribing to develop an in-depth understanding of the challenges.

**Data coding and identification of events at the empirical and real level**

An exploration of contextual causal mechanisms and the nature of their interaction was the objective. Therefore, a thematic analysis was used to evaluate the primary data. Also, this method of analysis is theoretically flexible and provides a detailed and multidimensional account of the data, thus allowing for determining of relationships (Vaismoradi et al., 2013; Braun and Clarke, 2006). The main empirical findings of the investigation were identified through a coding process. The literature review on widespread issues of project management development in Sub-Saharan Africa and the literature on systems within an organisation (Too and Weaver, 2014; White and Fortune, 2009) were used to form a logical justification for themes.

The process of identifying coding instances was an iterative process which consisted of revisiting the literature and interview memos. In keeping with Corbin and Strauss (2008) steps to coding, instances of activities and events were first coded and grouped into categories (i.e. open coding process). The large number of initial codes were further coded based on the relationship of the categories (i.e. axial coding process) into 12 sub-themes. Lastly, the axial codes were organised, integrated and categorised under 4 main themes - external environment, governance system, middle management system and the project execution system (selective coding). Based on CR categories, the 4 themes are the “Real” objects of the study. They represent the organisational components contained within a system, in this case, NGO. Identification of the main themes emerge from data or are embedded in a theoretical framework, for
example, people, groups and sub systems (Bygstad and Munkvold, 2011; Danermark et al., 2002). The main themes (selective coding) and subthemes (axial coding) are shown in Fig 2.

**INSERT FIG 2 HERE**

**Data analysis through Abduction - Theoretical re-description**

According to CR ontology, data analysis begins with the identification of events or observations at the empirical level of reality. These events were compared with concepts in the literature to obtain reliable explanation - Theoretical re-description or Abduction. Four systems were recognised during the coding process. At this stage, the findings seemed to challenge the project governance framework (Too and Weaver, 2014) such that, although four nested systems were discussed in the authors' framework, the external environment was not salient. However, because findings from the current study also paralleled with the systems thinking theory, which illustrates a four-level model system, there was heightened confidence during the coding process. Therefore, inferring from the concept of an open system, an environment external to the governance and management mechanisms exists which interacts with the system such that it is capable of influencing activities within the system (Scott and Davis, 2015; White and Fortune, 2009).

The core element of systems thinking model suggests that events or experiences, which are the problems easily seen, are traceable to a ‘history’ of past activities or behaviours which presents a pattern caused by systemic structures and mental models that are often invisible (See fig 1). At the first level of the hierarchy is our recognition and experiences of events, such as the use of a project management template or methodology and required skills/competencies. Most of what we know is at this level because it is visible. Thus, interventions and treatment of issues (which seems the most straightforward solution) occur at this level, though they usually do not provide enduring solutions. Events that are experienced are encountered daily. The second level contains the patterns that connect separate events such as senior management support. This level provides a richer representation that gives more insight to the events experienced. The third level, represents a deeper level seeking to explain the interplay of social, political, economic, and structural elements that produces the observed patterns. It contains systemic structures such as an organisation’s support and strategy for project management. The fourth level, which is the most concealed and deepest, represents the mental models of individuals, which are underpinned by our beliefs, values and assumptions that influence why things are the way they are.
Sheffield et al., (2012) describe mental models as habitual or instinctual ways of understanding/knowledge that are the basis of our individual and collective response. Figure 3 presents a theoretical re-description of the themes from the data against the elements of systems thinking described above and stratified domains of CR. It can be observed that the External Environment has the potential to impact on the internal system of the organisation, while on the contrary, CR does not explicitly consider the External Environment but emphasises internally related physical and social objects.

Data Analysis through Retroduction (identification of causal mechanisms)

The last stage of CR application focuses on the identification of causal mechanisms. This is referred to as Retroduction, and aims to identify how social objects interact with contextual situations to produce the observed results. The process of Retroduction was subsequently performed using a causal loop diagram model to represent the causal relationships, thereby exploring the causal underlying powers affecting project management practice.

The study began with some expectations from existing theory and literature. Although many of the narrated accounts of project managers were parallel to the findings from previous research and the project governance framework earlier on elucidated, two significant causal mechanisms behind the challenges of practicing project management previously unidentified in existing literature were traditional orientation (a sub-theme under mental models) and autonomy of middle managers.

The occurrence of a middle-management system was a significant insight into the study. Despite the recognition of the role of middle managers in identifying and enhancing adequate and appropriate competencies, and providing motivation and support for staff (Rouleau and Balogun, 2011), this system is not always emphasised in organisations (Koch et al., 2015). It is also expedient to assume that the recognition of this system is heightened in public organisations due to the level of bureaucracy. Based on the responses it was observed that middle managers had a causal effect on activities in the organisation due to their level of autonomy.

Further analysis of the autonomy of middle managers causal mechanism led to an interesting observation - A relationship between inadequate project management knowledge, inadequate project management training and development, and the perception of project management (a sub-theme under inadequate project management knowledge). Responses indicated that these components within the middle
management system had no interactions with the external system, nevertheless, had the capability of self – organising the subsystem such that it was capable of reproducing itself and maintaining the entire system by acquiring the internal presence of the other elements within the organisation. This feature in systems thinking is referred to as autopoiesis (Fernández et al., 2014; Razeto-Barry, 2012). In other words, middle managers by virtue of their autonomy and ‘physical proximity’ are able to positively impact the development of project management in this environment if they gain the right perspective to project management, acquire relevant knowledge and facilitate project management training and development within the organisation. Since autopoietic systems are capable of growing until they spontaneously provoke stability in regulating an internal system (Razeto-Barry, 2012), a small but frequent attempt to initiate PMP at the management level may likely have a larger positive effect elsewhere in the organisation eventually.

The effect of traditional orientation on the administration and structure of the organisation was another causal mechanism that emerged. Traditional orientation represents the basic underlying assumptions of executive officials and policymakers, and it relates to the level of culture as basic underlying assumptions (Schien, 2010). The anthropologist view of organisational culture is one operating at a sub-conscious level and confined by group parameters such as language, belief system and regularities that provide the basis for allocating status, power and authority etc (Willcoxson and Millett, 2000; Alvesson and Berg, 1992). The shared values and beliefs of the organisations are engendered and assimilated into working practices, thereby producing the effect of what is seen or experienced. Many of the project managers in the NGO reported that the traditional orientation of policymakers, the traditional beliefs and ways of operating impedes advancements or changes to the ‘usual ways’ of doing things. There were reports such as the fear of policymakers to try out a new development or practice and the lack of seriousness about productivity within the government civil service. Traditional orientation had a causal effect on ‘weak structure of the organisation’, ‘no national policy’ and ‘poor internal administration’.

Studies that investigated project management challenges in similar contexts usually identified broad institutional, structural and cultural issues (Shuaib, 2016; Zuofa and Ochieng, 2014) without a relational explanation as to how the outcomes are generated.

**Concluding reflections**

The process of theoretical re-description in fig 3 not only revealed similarities between CR and ST, but it simultaneously brings to our awareness the limitations of CR. Although they both argue against reductionism, CR tends to have a primary focus on closed systems where event regularities are generated
(Pratten, 2007) thus arguing that constitutive elements in the same condition will always behave in the same way. This proposition is reflected through the autopoietic system within the middle management system. However, the internal interactions within the organisation illustrated by applying ST shows that systems, where event regularities do not occur, are also critical in explaining social phenomena. Therefore, even though CR tends to suggest that social inquiry is contingent on abstraction, it does not have to assume that the system under study is a closed one.

The second causal mechanism demonstrates how elements outside a system impacts on the system. This challenges CR proponents who claim that elements that can influence a system must be within the system. The domain of the external appears to be discreet in CR, although it is the crux of systems theory. The analysis thus suggests that external mechanisms outside of our reality are able to influence that reality. In other words, as we aim to identify and explain elements of reality that exist for social occurrences to have taken place, we should consider the environment of the reality and the forces acting on it. ST is seen to be mutually supportive and reinforces the importance of using a guiding theory in CR research.

The study has demonstrated how CR, as a philosophical framework, is applied to empirical qualitative research. Albeit there are examples of applied qualitative research using CR, only a few have discussed their methods of data analysis or shown the relevance/benefits of using an existing theory. However, this does not suggest that there is an exclusive method best suitable for conducting CR studies; instead, the aim here is to suggest one approach (out of the many) - which is the use of General Systems Theory to understand interactions within levels of domains. There are various methods allowed in CR, and though many of them have relied on grounded theory as a methodological framework, the application of ST will enable one to gain more insights into the characteristics/nature of existing causal relationships.

In relation to the research background, this interpretation facilitates the process of attaining an informed decision for policymaking concerning how the concept of project management practice can be developed and deployed. It is pertinent to note, however, that modelling and establishing causal relationships are a subjective process; therefore, it is difficult to confirm the completeness or correctness of the representation. A model is one’s representation of reality developed to explain a particular challenge or phenomenon (Sterman, 2002). Thus, the nature of the relationship between agency and structure established in one context may not necessarily be replicated in another context. Nevertheless, critical realism seeks to generalise about theoretical suggestions which are sustainable and can be applied through time and space.
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### Paradigms

| Philosophical Position | Positivism | Interpretivism | Pragmatism | Critical Realism |
|------------------------|------------|----------------|------------|------------------|
| **Ontology**           | Variants are Realism, Empiricism etc. Belief in an external reality independent of human thought or perception. Equates reality with recordable events (Mingers 2006). | Variants are Relativism and Constructivism etc. Denies the possibility of knowing that which is real. Reality is as a result of human experiences and events (Easterby-Smith et al., 2012). | Propose that ontological and epistemological views can be separated from a research and that truth is understood in terms of the practical effects of what is believed (Tashakkori and Teddlie 1996; Scott 2007). | Believes in a real world independent of people’s perception, i.e. world functions as a multidimensional system and that causal structures that explains a phenomenon may remain latent until activated in specific situations (Mcevoy and Richards 2003). |
| **Epistemology**       | Knowledge is derived from experience of the world. Researcher is separate from that which is being investigated (Hjørland, B. and Wikgren 2005). | Knowledge are created from the action and perception of the social actors. Researcher is not separated from that which is being investigated (Saunders et al 2009; Bryman 2012). | Knowledge can be obtained by the use of various methods required to achieve the optimum results (Johnson and Onwuegbuzie 2004). | Knowledge is obtained by observing and interpreting meaning in order to explain elements of reality that must exist prior to the events and experiences that occurred (Wynn and Williams 2012). |
| **Methodology**        | Investigates regularities at the level of events. Mainly applies quantitative methods: observations, experimentation. Deals with numbers and facts (Bryman 2015). | Subjective study, deep reflections through. Mainly applies qualitative methods such as in-depth unstructured interviews and grounded theory research (Saunders et al., 2009). | Combination of both qualitative and quantitative approaches in other to complement each other. (Creswell et al., 2000) | Typically, research design is an intensive study with a limited number of cases. Involves Retroduction: making observations and theorizing a mechanism to explain the particular phenomenon (Bygstad and Munkvold 2011). |
| **Task of Researcher** | To induce strongly supported hypothesis from empirical observation and to test and improve them in an attempt to confirm invariable laws through experimentation (Bryman 2015). | To explore and reinterpret subjective meaning mainly through the identification of discourse and their construction of meaning (Edwards, P.K. et al., 2014.) | To be capable of demonstrating flexibility when formulating a methodology by offering a mix of paradigms and methods as directed by the research question (Howe 1988) | To provide a rich and reliable explanation of patterns of events through the development of appropriate accounts of the causal powers, entities and mechanisms which created them (Edwards et al. 2014). |

Table 1  Assumptions of Positivism, Interpretivism, Pragmatism and CR Paradigms  Source: Author generated
Fig 1. Iceberg model of Systems Thinking  Adapted from Sheffield et al., (2012)
Fig. 2 Visual display of themes and subthemes coding index using Nvivo
Fig. 3 Theoretical re-description of themes from the data using ST and CR