

# Critical realism: what you should know and how to apply it.

LAWANI, A.

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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

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3 research is discussed. Thematic data analysis which is consistent with CR ontology and epistemology  
4 (Fletcher, 2017) is used to deduce key and sub themes. The process of analysis in CR, Retroduction, is  
5 elucidated. This process involved the explanation of significant characteristics of causal relationship using  
6 systems thinking to arrive at a theoretical explanation or re- description (Mingers, 2006; Bhaskar 1998)  
7 which ultimately led to the identification of causal mechanisms driving current trends in project  
8 management development in a Nigerian government organisation (NGO). Systems Thinking consists of  
9 several schools of thoughts with varying views (Ababneh *et al.*, 2009). The focus here is on the General  
10 Systems Theory perspective.  
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### 21 **Overview of Critical Realism (CR)**

22 Developed by Bhaskar in the 70s and 80s, CR is a philosophical system which has progressed by other  
23 scholars and is positioned as an alternative to positivism and interpretivism paradigms (Archer *et al.*,  
24 2013; Bhaskar, 2013). It leverages aspects of both to offer new approaches to developing knowledge by  
25 recognising the role of subjective information of social actors in a given context while taking note of the  
26 independent structures that constrain and facilitate these actors to carry out certain activities in that  
27 context (Sayer, 2010). In the same vein, CR is regarded as a philosophy about social structures and human  
28 agency, and their interaction is used as a basis for the analysis of complex phenomenon for theorising the  
29 relative interplay of structures, culture and agency (Hjørland and Wikgren, 2005). Despite the assertion  
30 of the methodological underdevelopment of its application (Yeung, 1997), CR provides researchers with  
31 novel opportunities to explore/investigate complex organisational occurrences in a holistic way (Easton,  
32 2010).  
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41 Bhaskar's (1998) criticisms of positivism and constructivist philosophies led to the emergence of CR. He  
42 refuted that reality is not exclusively about what is empirically known and argued that the nature of the  
43 world is not reducible to our knowledge of reality, therefore it is not possible to make inference, as in  
44 natural science, through the use of experiments. In response to the constructivists, he contended reality  
45 is not entirely constructed through the knowledge or discourse of the social actors (Bhaskar, 1998) and  
46 advocated that reality independent of our conception and knowledge of it exists, but this is not accessible  
47 to direct observation. CR suggests that our knowledge of the external world consists of subjective  
48 interpretations and is fallible because they are formed by the conceptual frameworks in which the  
49 researcher operates (Mcevoy and Richards, 2003; Bhaskar, 1998).  
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57 For a critical realist, reality has causal powers and mechanisms, which can be experienced by their ability  
58 to cause or make things to occur (Danermark *et al.*, 2002). Therefore, the ability to participate in causal  
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3 analysis in a given context makes CR valuable for analysing social problems and proffering solutions  
4 (Fletcher, 2017). Table 1 shows the differences between CR and major philosophical positions based on  
5 their assumptions.  
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### 16 **Ontological and Epistemology of CR**

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19 Ontologically, CR assumes that reality is multi-layered or stratified into three domains: The Real, the  
20 Actual and the Empirical. The domain of the Real consists of deep structures of objects or entities which  
21 are physical, social and internally related. The Real contains total reality; the mechanisms, events,  
22 experiences and causal powers inherent to these objects or entities as they independently exist. The  
23 domain of the Actual consists of events that takes place when causal powers of structures and objects  
24 are enacted, in spite of whether they are observable or not. Lastly, the domain of the Empirical are those  
25 events that are experienced or observable through perception or measurement (Archer *et al.*, 2013).  
26 These domains are nested within each other such that it is impractical to reduce what causes an event in  
27 one level to another level because at each level some new experience emerges (Hjørland and Wikgren,  
28 2005).  
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36 Epistemologically, CR conceives a description of the real world through an analysis of the experiences of  
37 participants. Consequently, there is a hermeneutic aspect involved in carrying out investigations. The  
38 knowledge claims that results from the analysis are aimed at identifying and explaining those elements  
39 of reality which must exist for the events and experiences being investigated to have taken place (Wynn  
40 and Williams, 2012). Therefore, the epistemological objective of CR is to describe and clarify the  
41 relationship between observed experiences, events and mechanisms. For critical realists, the main  
42 objective of the investigation is to acquire knowledge about underlying causal mechanisms in order to  
43 achieve an explanation of how things work.  
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50 A stratified ontology is the core of Critical Realism (Bygstad and Munkvold, 2011). All levels are part of  
51 the same environment or reality and are represented as three overlapping or nested domains (Archer *et*  
52 *al.*, 2013; Mingers 2006). The primary objective of CR is to explain a social occurrence by referencing  
53 causal mechanisms and the potential consequences they have throughout the stratified 3-layers of reality  
54 (Fletcher, 2017).  
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### **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

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3 many having a different focus or viewpoint, which often leads to confusion (Arnold and Wade 2015).  
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5 Some of the techniques and approaches developed for different situations in different disciplines include  
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7 systems dynamics (Senge, 1997), critical systems (Jackson, 2001) and soft systems methodology  
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9 (Checkland, 1981). In categorising the approaches, there have been variations too, Reynolds and Holwell  
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11 (2010) identified 19 ST methods and Ababneh's *et al.*, (2009) graphical representation shows 14 ST  
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13 approaches.

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

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

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37 *INSERT FIG 1 HERE*  
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42 The Iceberg model is a conventional and well recognised systems thinking tool designed to assist in  
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44 providing a holistic view by discovering patterns of behaviour, supporting structures and mental models  
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46 underlying a specific event or phenomenon. The model suggests that events or experiences, which are  
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48 the issues easily seen, are traceable to a 'history' of past activities or behaviours which presents a pattern  
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50 caused by systemic structures and mental models that are often invisible (Maani and Cavana, 2007).

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52 The philosophy of critical realism and systems thinking approach both argue against reductionism.  
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54 However, the difference between the views of system theorists and critical realists lies in the definition  
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56 of openness and closure such that the latter explains them in terms of the structure of the system while  
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58 the former focuses on its manifestation or outcome (Chick and Dow, 2005). Advocates of CR opine that  
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60 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

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3 required rather than the magnitude of the problem, an intensive approach was adopted involving a case  
4 study. Moreover, the extensive method has been argued to be associated with quantitative data  
5 collection and statistical analysis (Danermark *et al.*, 2002).  
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9 The first stage of data collection was a comprehensive literature review on the widespread trends of  
10 barriers to project management development in Nigeria. The relevance of this process was to establish  
11 patterns and define a problem or question, which is theory-driven. An intensive data collection stage  
12 involved semi-structured interviews undertaken with 17 experienced project managers from a  
13 government organisation having the mandate to execute construction building projects in Nigeria. A  
14 semi-structured interview format was used to ensure flexibility in exploring and updating existing  
15 literature on project management challenges while still allowing new thoughts to emerge.  
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21 Data from the interviews were transcribed and cleaned before importation to NVivo for data  
22 management. A considerable amount of time was spent during the data collection process and  
23 transcribing to develop an in-depth understanding of the challenges.  
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### 29 ***Data coding and identification of events at the empirical and real level***

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31 An exploration of contextual causal mechanisms and the nature of their interaction was the objective.  
32 Therefore, a thematic analysis was used to evaluate the primary data. Also, this method of analysis is  
33 theoretically flexible and provides a detailed and multidimensional account of the data, thus allowing for  
34 determining of relationships (Vaismoradi *et al.*, 2013; Braun and Clarke, 2006). The main empirical  
35 findings of the investigation were identified through a coding process. The literature review on  
36 widespread issues of project management development in Sub-Saharan Africa and the literature on  
37 systems within an organisation (Too and Weaver, 2014; White and Fortune, 2009) were used to form a  
38 logical justification for themes.  
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46 The process of identifying coding instances was an iterative process which consisted of revisiting the  
47 literature and interview memos. In keeping with Corbin and Strauss (2008) steps to coding, instances of  
48 activities and events were first coded and grouped into categories (i.e. open coding process). The large  
49 number of initial codes were further coded based on the relationship of the categories (i.e. axial coding  
50 process) into 12 sub-themes. Lastly, the axial codes were organised, integrated and categorised under 4  
51 main themes - external environment, governance system, middle management system and the project  
52 execution system (selective coding). Based on CR categories, the 4 themes are the "Real" objects of the  
53 study. They represent the organisational components contained within a system, in this case, NGO.  
54 Identification of the main themes emerge from data or are embedded in a theoretical framework, for  
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3 example, people, groups and sub systems (Bygstad and Munkvold, 2011; Danermark *et al.*, 2002). The  
4 main themes (selective coding) and subthemes (axial coding) are shown in Fig 2.  
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### 15 **Data analysis through Abduction - Theoretical re-description**

16 According to CR ontology, data analysis begins with the identification of events or observations at the  
17 empirical level of reality. These events were compared with concepts in the literature to obtain reliable  
18 explanation - Theoretical re-description or Abduction. Four systems were recognised during the coding  
19 process. At this stage, the findings seemed to challenge the project governance framework (Too and  
20 Weaver, 2014) such that, although four nested systems were discussed in the authors' framework, the  
21 external environment was not salient. However, because findings from the current study also paralleled  
22 with the systems thinking theory, which illustrates a four-level model system, there was heightened  
23 confidence during the coding process. Therefore, inferring from the concept of an open system, an  
24 environment external to the governance and management mechanisms exists which interacts with the  
25 system such that it is capable of influencing activities within the system (Scott and Davis, 2015; White and  
26 Fortune, 2009).  
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37 The core element of systems thinking model suggests that events or experiences, which are the problems  
38 easily seen, are traceable to a 'history' of past activities or behaviours which presents a pattern caused  
39 by systemic structures and mental models that are often invisible (See fig 1). At the first level of the  
40 hierarchy is our recognition and experiences of **events**, such as the use of a project management template  
41 or methodology and required skills/competencies. Most of what we know is at this level because it is  
42 visible. Thus, interventions and treatment of issues (which seems the most straightforward solution)  
43 occur at this level, though they usually do not provide enduring solutions. Events that are experienced  
44 are encountered daily. The second level contains the **patterns** that connect separate events such as  
45 senior management support. This level provides a richer representation that gives more insight to the  
46 events experienced. The third level, represents a deeper level seeking to explain the interplay of social,  
47 political, economic, and structural elements that produces the observed patterns. It contains **systemic**  
48 **structures** such as an organisation's support and strategy for project management. The fourth level,  
49 which is the most concealed and deepest, represents the **mental models** of individuals, which are  
50 underpinned by our beliefs, values and assumptions that influence why things are the way they are.  
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3 Sheffield *et al.*, (2012) describe mental models as habitual or instinctual ways of  
4 understanding/knowledge that are the basis of our individual and collective response. Figure 3 presents  
5 a theoretical re-description of the themes from the data against the elements of systems thinking  
6 described above and stratified domains of CR. It can be observed that the External Environment has the  
7 potential to impact on the internal system of the organisation, while on the contrary, CR does not  
8 explicitly consider the External Environment but emphasises internally related physical and social objects.  
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### 21 ***Data Analysis through Retrodution (identification of causal mechanisms)***

22 The last stage of CR application focuses on the identification of causal mechanisms. This is referred to as  
23 Retrodution, and aims to identify how social objects interact with contextual situations to produce the  
24 observed results. The process of Retrodution was subsequently performed using a causal loop diagram  
25 model to represent the causal relationships, thereby exploring the casual underlying powers affecting  
26 project management practice.  
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33 The study began with some expectations from existing theory and literature. Although many of the  
34 narrated accounts of project managers were parallel to the findings from previous research and the  
35 project governance framework earlier on elucidated, two significant causal mechanisms behind the  
36 challenges of practicing project management previously unidentified in existing literature were traditional  
37 orientation (a sub-theme under mental models) and autonomy of middle managers.  
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41 The occurrence of a middle-management system was a significant insight into the study. Despite the  
42 recognition of the role of middle managers in identifying and enhancing adequate and appropriate  
43 competencies, and providing motivation and support for staff (Rouleau and Balogun, 2011), this system  
44 is not always emphasised in organisations (Koch *et al.*, 2015). It is also expedient to assume that the  
45 recognition of this system is heightened in public organisations due to the level of bureaucracy. Based on  
46 the responses it was observed that middle managers had a causal effect on activities in the organisation  
47 due to their level of autonomy.  
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54 Further analysis of the autonomy of middle managers causal mechanism led to an interesting observation  
55 - A relationship between inadequate project management knowledge, inadequate project management  
56 training and development, and the perception of project management (a sub-theme under inadequate  
57 project management knowledge). Responses indicated that these components within the middle  
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3 management system had no interactions with the external system, nevertheless, had the capability of self  
4 – organising the subsystem such that it was capable of reproducing itself and maintaining the entire  
5 system by acquiring the internal presence of the other elements within the organisation. This feature in  
6 systems thinking is referred to as *autopoiesis* (Fernández *et al.*, 2014; Razeto-Barry, 2012). In other words,  
7 middle managers by virtue of their autonomy and ‘physical proximity’ are able to positively impact the  
8 development of project management in this environment if they gain the right perspective to project  
9 management, acquire relevant knowledge and facilitate project management training and development  
10 within the organisation. Since autopoietic systems are capable of growing until they spontaneously  
11 provoke stability in regulating an internal system (Razeto-Barry, 2012), a small but frequent attempt to  
12 initiate PMP at the management level may likely have a larger positive effect elsewhere in the  
13 organisation eventually.

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

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

### 54 **Concluding reflections**

55 The process of theoretical re-description in fig 3 not only revealed similarities between CR and ST, but it  
56 simultaneously brings to our awareness the limitations of CR. Although they both argue against  
57 reductionism, CR tends to have a primary focus on closed systems where event regularities are generated  
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3 (Pratten, 2007) thus arguing that constitutive elements in the same condition will always behave in the  
4 same way. This proposition is reflected through the autopoietic system within the middle management  
5 system. However, the internal interactions within the organisation illustrated by applying ST shows that  
6 systems, where event regularities do not occur, are also critical in explaining social phenomena.  
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8 Therefore, even though CR tends to suggest that social inquiry is contingent on abstraction, it does not  
9 have to assume that the system under study is a closed one.  
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14 The second causal mechanism demonstrates how elements outside a system impacts on the system. This  
15 challenges CR proponents who claim that elements that can influence a system must be within the  
16 system. The domain of the external appears to be discreet in CR, although it is the crux of systems theory.  
17 The analysis thus suggests that external mechanisms outside of our reality are able to influence that  
18 reality. In other words, as we aim to identify and explain elements of reality that exist for social  
19 occurrences to have taken place, we should consider the environment of the reality and the forces acting  
20 on it. ST is seen to be mutually supportive and reinforces the importance of using a guiding theory in CR  
21 research.  
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28 The study has demonstrated how CR, as a philosophical framework, is applied to empirical qualitative  
29 research. Albeit there are examples of applied qualitative research using CR, only a few have discussed  
30 their methods of data analysis or shown the relevance/benefits of using an existing theory. However, this  
31 does not suggest that there is an exclusive method best suitable for conducting CR studies; instead, the  
32 aim here is to suggest one approach (out of the many) - which is the use of General Systems Theory to  
33 understand interactions within levels of domains. There are various methods allowed in CR, and though  
34 many of them have relied on grounded theory as a methodological framework, the application of ST will  
35 enable one to gain more insights into the characteristics/nature of existing causal relationships.  
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42 In relation to the research background, this interpretation facilitates the process of attaining an informed  
43 decision for policymaking concerning how the concept of project management practice can be developed  
44 and deployed. It is pertinent to note, however, that modelling and establishing causal relationships are a  
45 subjective process; therefore, it is difficult to confirm the completeness or correctness of the  
46 representation. A model is one's representation of reality developed to explain a particular challenge or  
47 phenomenon (Sterman, 2002). Thus, the nature of the relationship between agency and structure  
48 established in one context may not necessarily be replicated in another context. Nevertheless, critical  
49 realism seeks to generalise about theoretical suggestions which are sustainable and can be applied  
50 through time and space.  
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3 No potential conflict of interest was reported by the author.  
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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 1998; 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

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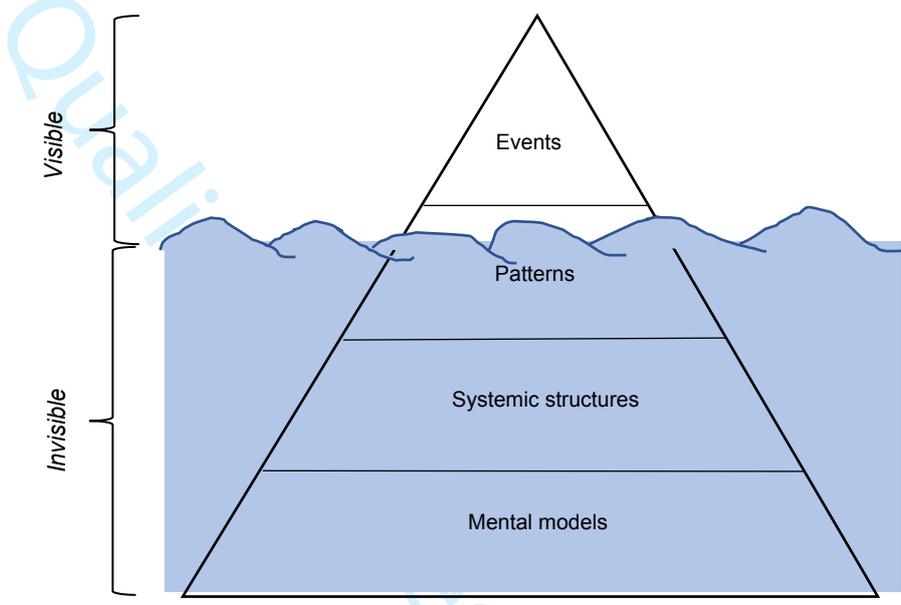


Fig 1. Iceberg model of Systems Thinking Adapted from Sheffield et al., (2012)

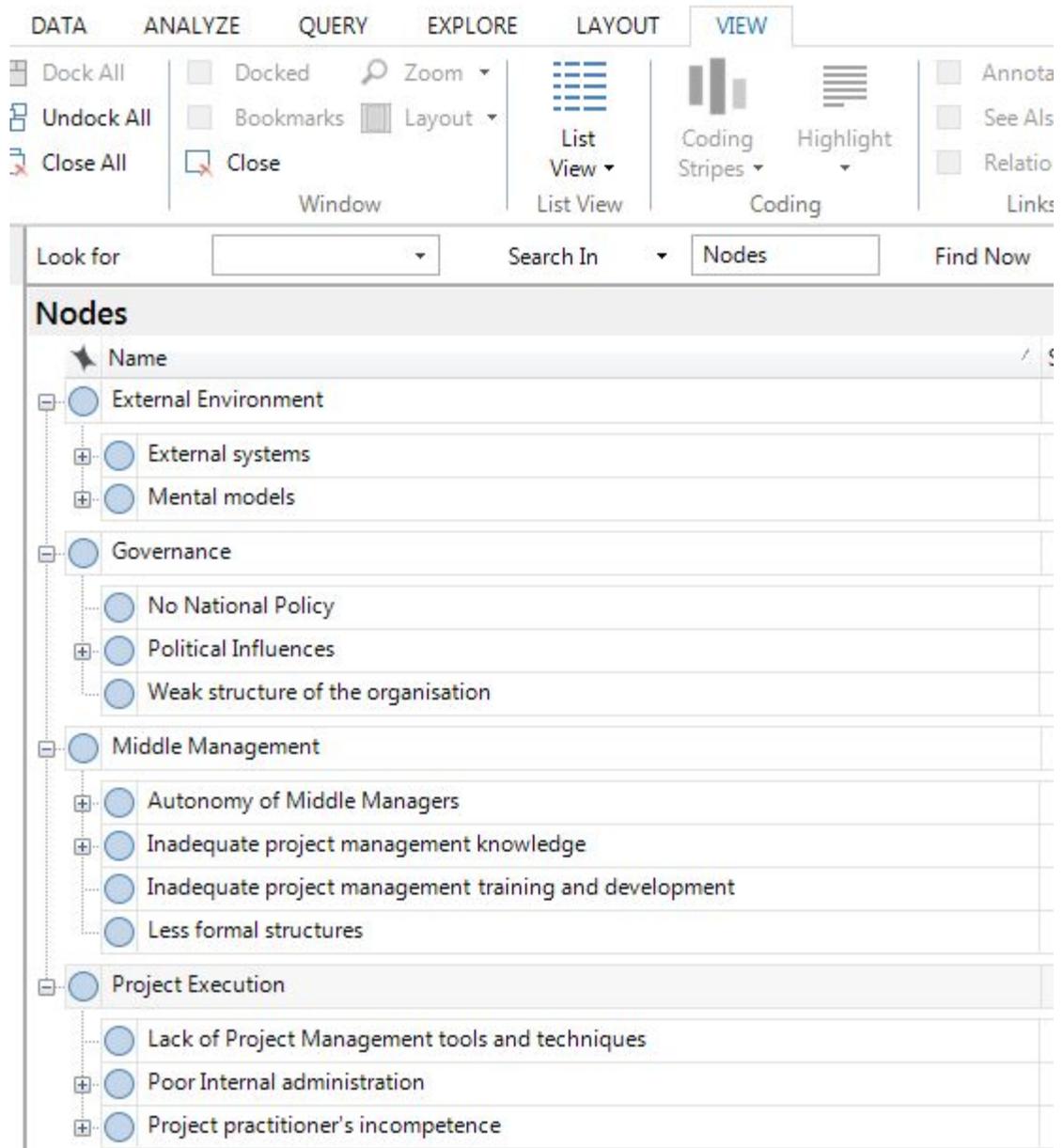


Fig. 2 Visual display of themes and subthemes coding index using Nvivo

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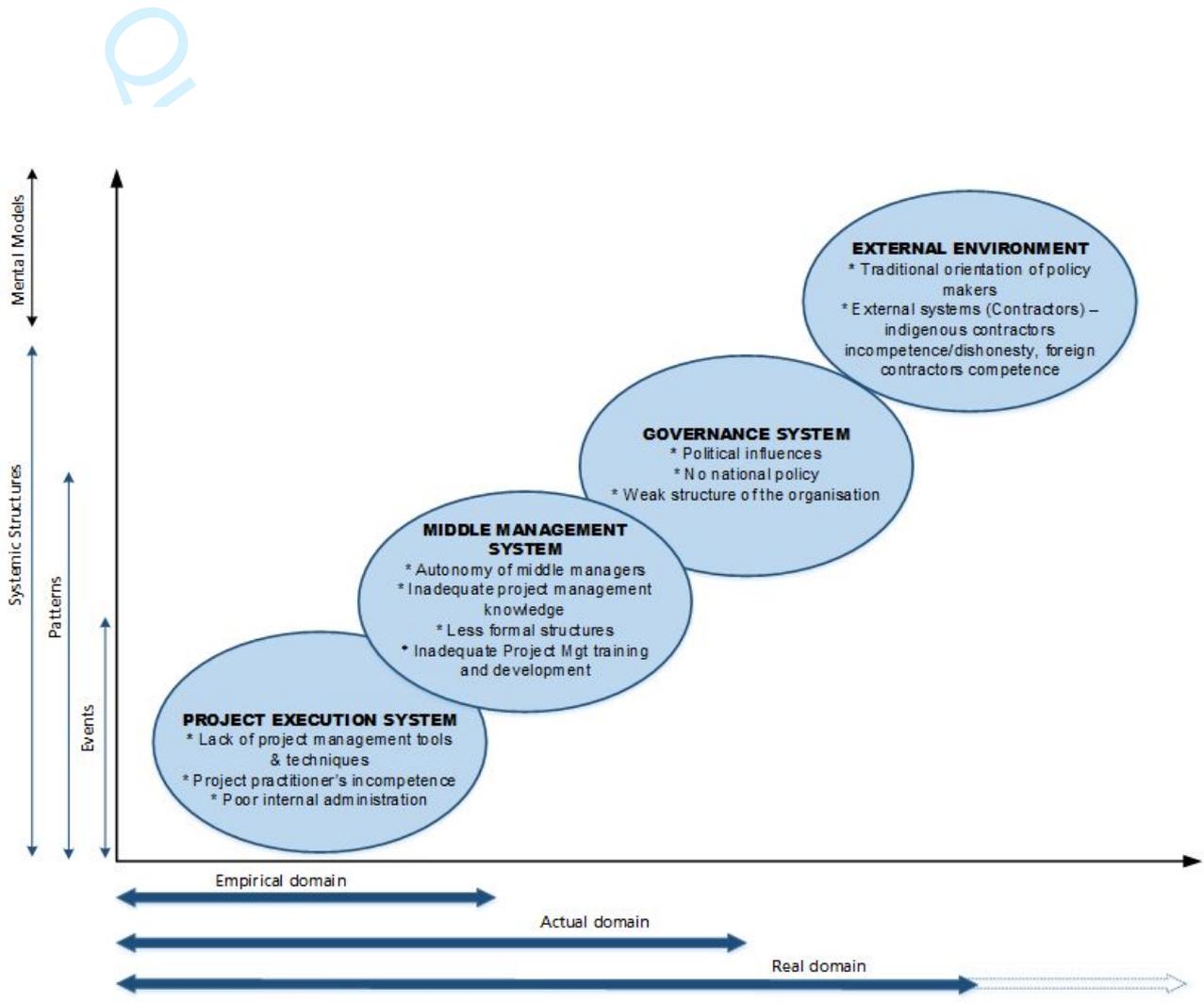


Fig. 3

Theoretical re-description of themes from the data using ST and CR