The Search for Mechanisms in Business Research: Reflections on Retroductive Analysis in a Multilevel Critical Realist Case Study

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Abstract: Many introductory research methods textbooks still divide the research paradigms into two broad approaches – positivist/quantitative/deductive and interpretive/qualitative/inductive. However, this bifurcation of research orientation does not do justice to the philosophical and methodological pluralism present within business research. This paper offers a third way by reflecting on a retroductive analysis in a critical realist case study. The philosophy of critical realism employs retroductive analysis to search for mechanisms underpinning the empirically observed events. Mechanism-based theorising is a suggested way in the business research to develop middle-range 'sometimes true' theories. This paper demonstrates the process of retroduction for the identification of mechanisms through an illustration of the data collection, coding and analysis process in a multilevel critical realist case study. In the process, it outlines the challenges faced and offers suggestions to overcome those challenges. This paper does not claim to provide a set of best practices for multilevel retroductive analysis. However, it is hoped that it sensitises business researchers to explore the critical realist perspective and to employ retroduction for mechanism-based theorising.

Keywords: Critical Realism, mechanism, retroduction, multilevel, coding, analysis

1. Introduction

Although there is a multiplicity of research philosophies in business research, many research methods textbooks still divide the philosophical discussion into two major approaches – positivism and interpretivism – which are usually presented as polar opposites (Knox, 2004). While the positivists primarily rely on deductive logic and test the hypothesis mostly using quantitative data, interpretivists usually look for meaning and patterns following inductive logic mostly using qualitative data. Consequently, business researchers working within the positivist philosophy claim to provide causally adequate theory via statistical analysis and those following interpretivist philosophy claim to provide adequate explanation at the level of meaning (Coldwell, 2007). Although there is some acknowledgement of other approaches in business research (e.g. design science or critical theory), the majority of the discussion still revolves around the two approaches. However, this bifurcation of research orientation does not do justice to the philosophical and methodological pluralism present within business research.

Critical realism is often proposed (Fleetwood, 2005; Mingers, 2004) as a third way in business research. This paper aims to sensitise business researchers towards exploring the critical realist perspective and employing retroduction for mechanism-based theorising. Towards this aim, the paper has twin objectives. First objective is to clarify the process of retroductive analysis by giving a systematic account of the data collection, coding and analysis process. Second objective is to discuss the challenges encountered during a retroductive analysis and offer suggestions to overcome those challenges. The paper is based on the observations and reflections during a critical realist case study within the enterprise system (ES) domain. Formative notes were prepared at different stages of the research and a summative reflection was conducted at the end of the research before writing this paper. The remainder of the paper is structured as follows. The following section provides a brief summary of the critical realist philosophy and retroductive analysis. Section 3 outlines the key requirements of data collection for a critical realist case study and reflects on how those requirements were fulfilled. Section 4 discusses the identification of mechanisms using multilevel retroductive analysis. It also outlines the challenges in retroductive analysis and offers suggestions to overcome those challenges. Finally, section 5 concludes the paper by discussing key takeaways and future research.

2. Critical realist philosophy and retroductive analysis

Before the exposition of critical realist philosophy and its methodological considerations, perhaps it is pertinent to clarify few assumptions here. First, it is acknowledged here that there is not a neat and tidy distinction between various research paradigms and the choices a researcher makes usually lie on a continuum (Cunliffe, 2011; Walsh et al., 2015a). Second, it is not asserted here that critical realism is a panacea for all

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business research or that it is free from any defects. Third, it is acknowledged that there is no 'single' version of critical realism and that it has some linkages with the pragmatist approach (DeForge and Shaw, 2012; Johnson and Duberley, 2000; Lipscomb, 2011). This research acknowledges the existence of a variety of different epistemological positions (within and outside critical realism) that have their own distinctive ways of engaging with reality and undertaking research (Johnson and Duberley, 2000; Newton, Deetz and Reed, 2011). Consequently, the aim for the researchers should be to maintain consistency with regard to the epistemological assumption they deploy. The main motive of this section is to introduce the reader with the key assumptions of the critical realist position underpinning this study. It may be noted, however, that this is not a place to discuss the critical realist philosophy in its entirety and an interested reader is referred to the works cited in this paper.

2.1 Basic tenets of critical realism

Roy Bhaskar is often credited with the development of critical realist philosophy initially for natural sciences (Bhaskar, 1975) and then for social sciences (Bhaskar, 1989). The critical realist philosophy is *realist* in the sense that it assumes that social and natural reality exist independently of our cognitive processes – an extra-mental reality exists whether or not human beings can actually gain cognitive access to it (Fleetwood, 2005; Johnson and Duberley, 2000). This may be a concrete reality (e.g. atmospheric pressure), or an abstract reality (e.g. social pressure), but it exists irrespective of our understanding of it (Maxwell, 2012). However, unlike the naive realist ontology of positivism that reality exists and is completely apprehendable, critical realists acknowledge that it is imperfectly apprehendable due to our bounded rationality (Simon, 1982) and fundamentally intractable nature of phenomena (Burrell and Morgan, 1979). The philosophy is considered *critical* since it asserts that the claims about reality are to be accepted with the caveat that there are significant limitations of objectivity of our knowledge (Mingers, Mutch and Willcocks, 2013). This position defends critical realism both against logical positivism that would reduce the world to empirically observed measurable events, and various forms of postmodernisms that would reduce the world to our ideas (Ackroyd and Fleetwood, 2000; Fleetwood, 2004, 2005; Maxwell, 2012; Mingers et al., 2013; Reed, 2005). Following Cunliffe's (2011) typology, a critical realist study would fall within the objectivist knowledge problematic but does not fall prey to epistemic fallacy (Mingers, 2004) of conflating reality with our understanding of it.

As originally proposed by Bhaskar (Bhaskar, 1975, 1989; Collier, 1994; Sayer, 2000, 2010), critical realism stratifies reality into three nested domains – real, actual, and empirical. The domain of the *real* is conceived to be independently existing and includes the entities, the structures and the causal powers inherent to them. The domain of the *actual* is considered a subset of the real and includes the events that occur due to the enactment of the causal powers of structures and entities. These events may or may not be observed by humans. Finally, the domain of the *empirical* is understood to be a subset of the actual and consists of our experiences via measurements or sense perception. The purpose of a critical realist study is to explain a given set of events by uncovering underlying mechanisms which, if they existed and were enacted, could have produced these events (Bhaskar 1975, 1989). For this reason, mixed-method research is often recommended for critical realist studies. While quantitative data helps in determining empirical regularities (Tsang, 2014), qualitative data helps in identifying the mechanisms that emerge from the components of a physical and social structure to produce the events of interest (Sayer, 2000, 2010). However, critical realist perspective also recognises that each event is not only dependent on the causal powers available within a social structure, but also on the continuously changing contextual conditions and the evolving properties of the structure (Wynn and Williams, 2012). Therefore, a causal explanation in critical realism accounts for a set of existing and enacted mechanisms, along with the impact of any structural factors and contextual conditions that generated the outcome being studied (Wynn and Williams, 2012).

2.2 Realism in business research

Within the domain of business research, although there was some discussion on realism at times (e.g. Dubin, 1982), serious attention was given towards the turn of the century. Tsang and Kwan (1999) discuss the potential of critical realism for replication and theory development in business research. Claiming a 'realist turn' in organisational and management studies, Ackroyd and Fleetwood (2000) and Fleetwood and Ackroyd (2004) present various theoretical, methodological, and empirical works associated with realism, arguing for explicit application of the realist paradigm. It is argued (Reed, 2005; Wynn and Williams, 2012) that due to its focus on an extra-mental reality, critical realism offers a way to address the rigor–relevance gap in business research. It is also interesting to note that independent of the discussion on critical realism, there are parallel developments in the idea of social mechanisms (McGrath, 2013). Although Coleman (1964) introduced the

concept of social mechanism as 'sometimes-true theory', it was explored in more detail in Hedström and Swedberg (1998). Davis (2006) and Avgerou (2013) suggest that the notion of mechanisms is implicit in many theories, for example, isomorphic 'forces' in the institutional theories. Campbell (2005) discusses various environmental, cognitive, and relational mechanisms to explain the process of institutional change. Mechanism are seen as building-blocks of middle-range theories that are useful for explaining problems around organisations and organising and to form more general process theories (Pettigrew, Woodman and Cameron, 2001). Social mechanisms are about "the wheelwork or agency by which an effect is produced. In this way, mechanisms do not merely address what happened but also how it happened" (Hernes, 1998, p. 74). Anderson et al. (2006) argue that that a focus on mechanisms enables one to move beyond individual variables and their linkages to consider the bigger picture of action in its entirety. A mechanism-based explanation moves beyond *describing what* to *explaining how*, and thereby clarifies causal ambiguity (Pajunen, 2008) surrounding a phenomena. In this sense, the philosophy of critical realism provides a sound basis for mechanism-based theorising within business research. In the ES domain, the mechanism-based theorising is considered even more relevant because the domain is marred by identification of too many surface-level critical success factors (Saxena and McDonagh, 2017) with less than adequate understanding of individual factors (Martin and Huq, 2007) under consideration.

2.3 Retroductive analysis in critical realism

Researchers usually engage in retroductive analysis (Chiasson, 2005; Danermark et al., 2002; Tsang, 2014) iteratively during a critical realist study. The use of the term requires some clarification here (thanks to the reviewer for pointing this aspect). Charles Pierce uses the term 'abduction' and 'retroduction' interchangeably in his earlier writings, but seems to differentiate between the two in his later work (Chiasson, 2005). In the latter interpretation, abduction is considered a mode of inference on par with induction and deduction. While Chiasson (2005) interprets abduction as making a 'hunch' on underlying mechanism, for Danermark et al. (2002) the key element of abduction is redescription and recontextualisation of structure and events. Conceiving abduction in this way, retroduction is defined as a recursive application (Chiasson, 2005) of abduction, induction, and deduction. Retroduction is more iterative and creative in nature as the researcher moves back and forth between the data and explanation. As Danermark et al. (2002) suggest, it involves *transfactual* thinking because we need to think beyond the observed factual events and theorise on underlying mechanisms. Retroduction is about advancing from the empirical observation of events to a conceptualisation of mechanism and contextual conditions that produce those events (Johnson and Duberley, 2000). Through an iterative process, researcher improves the understanding of those mechanisms (Tsang, 2014; Volkof and Strong, 2013).

Since retroduction is largely a creative and intuitive process (Danermark et al., 2002), issuing specific guidelines for retroducing mechanisms is considered problematic (Wynn and Williams, 2012). However, Tsang (2014) notes four types of retroduction based on Eco (1983) – overcoded, undercoded, creative, and meta-retroduction – that may help in identifying the mechanisms. In *overcoded* retroduction, the mechanisms are directly available from the literature and the researcher's task is to explain the events employing those mechanisms. In *undercoded* retroduction, the current body of knowledge suggests a number of potential mechanisms and the researcher determines the ones that best explain the events under consideration. In *creative* retroduction, the researcher has to invent the mechanism because no suitable mechanisms are available in the literature. Finally, in *meta-retroduction*, observations do not fit our current conceptual schema and require us to think anew. This may result in some kind of paradigm change (Kuhn, 1962). The retroduction process for this research is discussed in detail in section four. Before that, however, next section discusses the data collection and preparation for a critical realist case study.

3. Data collection and preparation for a critical realist case study

One implication of critical realist data collection is that the collected data needs to be longitudinal to enable search for patterns across processes (Pettigrew, 1997; Dawson, 1997; Langley et al., 2013). George and Bennett (2005: p. 21) note that if performed with sufficient details, process tracing through a single longitudinal case study helps in examining the operation of causal mechanisms. Single case design allows the researcher to look for many intervening factors and inductively observe any unexpected aspects of the operation of a particular causal mechanism, or to identify the contextual conditions that activate the causal mechanism. Therefore, the main challenge for this study was to look for and gain access to a case that allows a longitudinal study of the ES implementation. After exploring multiple organisations, the researcher gained

access to a public service organisation from the health sector. The case organisation engaged in three instances of ES implementations during 2000-2015, with the first and the third implementation deemed successful by the organisation. To begin with, the secondary data associated with the case was collected and analysed. This included both the documentation made publicly available by the case organisation as well as the archival data from other public sources. Analysis of the documents served three purposes. First, it enabled the researcher to arrive at a chronology of events. Second, it guided towards the identification of key actors who would be interview participants. Finally, it sensitised the researcher towards certain themes around which the interview questions were framed. Overall, the secondary data analysis provided a scaffolding to the primary data collection. Primary data mainly consisted of in-depth qualitative interviews with organisational participants. This study adopted responsive interviewing method of Rubin and Rubin (2012) in which interview starts with general questions and new questions are framed based on the participants' answers. This allows capturing rich details as they emerge. Additionally, further secondary data collection continued along with the interviews.

Another implication of critical realist data collection is that data collection needs to be multilevel to search for mechanisms operating across multiple levels (Langley, 1999; Pettigrew, Woodman and Cameron, 2001), for example, for assessing the impact of a changing socio-economic context on features of intra-organisational processes. Since this research primarily focused on technology in organisations, the three levels suggested by the socio-technical systems theory – macrosocial, organisation, and work-system level (Trist, 1981; Winter, Berente, Howison and Butler, 2014) – were employed for data collection. *Work-systems* carry out a specific set of activities in an identifiable and bounded subsystem of an organisation such as a department or a service unit. It may consist of a group of personnel and the relevant equipment and other resources. *Organisational* systems may correspond to a plant, a workplace, or a public agency. Finally, *macrosocial* systems include communities, industrial sectors, and institutions operating at the overall level of a society.

A main challenge at this stage was to ensure the multilevel nature of data. Relevant documents pertaining to all three levels were collected. At the work-system level, relevant documents included system requirement specifications, project planning documents, minutes of the project meetings, and project audit documents. Organisational level documentation included strategy documents, minutes of the board meetings, and annual reports. Finally, at the macrosocial levels, there were reports of the government auditor, minutes of parliamentary committee meetings, and newspaper articles. Similarly, during the primary data collection, interview participants included the members from the project team (both IT and non-IT), middle level management, and the top-level management to ensure the internal generalisability (Maxwell, 2012). The top management was considered a proxy for assessing the macrosocial processes since they often interact with organisation's external context (Martin and Huq, 2007). Ideally, the actors outside the organisation (e.g. people from the Department of Health, the ES supplier) should have been interviewed for comprehensively accessing the macrosocial level, it was not possible due to access and time limitations. To overcome this limitation, secondary data also included publicly available information on the Department of health and the ES supplier.

Once all the interviews (twenty-seven in total) were conducted and transcribed, the next challenge was to make sense of everything. First, a descriptive case narrative was written describing the events, structure and context. The narrative was in the form of process tracing which was highly specific to the case (George and Bennett, 2005, p. 210) and did not make any explicit use of the theory. Essentially, it focused on providing 'pure' description (Walcott, 2009, p. 27-29) trying to present the events as they unfolded without any efforts to analyse so that richness of the case is not compromised. It was a major challenge to free the narrative from any attempt of theorising. For this reason, writing of the narrative was commenced immediately after the data collection, i.e. in parallel with the transcription of the interviews. The narrative was continuously revised based on the emergent understanding of the researcher. Keeping the case narrative separate from the analysis also helped in ensuring the descriptive validity (Maxwell, 2012) of the narrative. The strategy of temporal bracketing (Langley, 1999) was used in writing the case narrative. For this purpose, key events at all three levels (macrosocial, organisational, and work-system) were identified across the timeline. Subsequently, the event-sequence and the interconnections between the events were narrated in detail based on the primary and secondary data. Following the socio-technical perspective, there was an effort to focus on both the social and the technical aspects of the exercise. This helped in presenting a holistic picture of the ES implementations in the case organisation. Once the writing of the narrative was complete (i.e. all events were described in

sufficient detail), the next step was the identification of mechanisms using retroductive analysis, which is explained in the next section.

4. Identification of mechanisms using retroductive analysis

A three-stage process (Farquhar, 2012; Miles, Huberman and Saldaña, 2013; Saldaña, 2013) of coding and analysis was followed for the identification of mechanisms. Since the coding process is similar to the one recommended in the grounded theory, it needs some clarification here. Although grounded theory is sometimes seen as a strictly inductive approach for analysing qualitative data (Douglas, 2003), over the years it is evolved as a more general and flexible method of data analysis within diverse research paradigms (Hunter et al., 2005; Walsh et al., 2015b). However, the analysis process is not claimed here to be classic grounded theory (Glaser and Strauss, 1967) since it was not an explicit part of the research design and because there was a continuous to and fro movement between data and theory. However, the process described in this section might suitably be termed as *grounded inquiry* (Fendt and Sachs, 2008) or *grounded theorising* (Holton in Walsh et al, 2015b). The analysis and coding process unfolded in three stages using a dialectic process of retroductive reasoning involving method and creativity (Klag and Langley, 2013).

4.1 Using induction to generate first-order codes

The coding process started with the first-order coding in which the descriptive codes were directly assigned to the chunk of data. The orthodox reading of the grounded theory method recommends microanalysis using line-by-line or even word-by-word coding. However, it may result in too much confusion for the researcher (Allen, 2003). Therefore, following Miles, Huberman and Saldaña (2013), the selected chunk of data was of varying lengths depending on the richness of the data and its context. All interview transcripts and relevant secondary data were coded at this stage. There were twin challenges at this stage. Being an *inductive* exercise, the codes had to be based on the data and not on the theory. A second and more crucial challenge was to preserve the multilevel nature of the research. In first-order coding, descriptive coding was applied along with nested coding (Saldaña, 2013). Descriptive coding summarised the chunk of text in a word or short phrase. Here, care was taken to remain true to the data and not to force any specific theoretical terminology. Once a first-order code was assigned to a block of text, the nested coding was used to preserve the contextual and multilevel nature of the data. Since the study used the socio-technical systems theory as a sensitising device, all the descriptive codes were assigned to one of the levels (Trist, 1981; Winter et al., 2014) – macrosocial, organisational, or the work-system level. The level of the code was determined based on the entities/events being discussed in the text and how they aligned with the definitions provided by Trist (1981). Depending on the research problem, business researchers may use other levels such as micro-meso-macro (Papadimitriou, 2010) or individual-group-organisational (Rice, 1969) etc. Table 1 illustrate a couple of examples from each level to demonstrate the first-order coding process.

Table 1: Example first-order codes

Text Block	Code	Level
"...they would appear to have about 70 percent of the blood banking market worldwide, so, absolutely a dominant player."	Dominant supplier	Macrosocial
"So when [enterprise system] came-in and we ended up before Public Accounts Committee trying to explain the overrun in cost."	Public accountability	Macrosocial
"Our concern in scientific side is safety. Have we tested it and is everything right? And is the donation fit to go?"	Safety Culture	Organisational
"I think [case organisation] has to understand that IT is an enabling service. Its role is to enable everybody to do their job, not controlling them..."	Role of IT	Organisational
"There was an unmerciful push to say go-live at all costs and that was driven completely by [project sponsor] and [project manager]."	Focus on go-live	Work-system
"So the version that we are taking to go-live with is a lot more stable, without a doubt."	System maturity	Work-system

4.2 Using deduction to generate second-order codes

Once all data was coded in the form of first-order codes, the first-order codes were grouped into second-order codes based on their underlying similarity. This phase introduced the *deductive* component of the analysis since the majority of second order codes were drawn from existing literature on ES critical success factors (Finney and Corbett, 2007; Saxena and McDonagh, 2017). During this exercise, the corresponding level of the first-order codes was maintained, thereby assigning levels to second-order codes as well. Table 2 illustrates the second-order coding process using an example from each level. It is acknowledged here that procedure was

not one-way and these codes were subject to revision, merger or deletion based on researcher's emerging understanding of the constructs (Miles, Huberman and Saldaña, 2013).

Table 2: Example second-order codes

First-order codes/Level	Second-order code	Level
Being First User/ Macrosocial	ES Market Structure	Macrosocial
Dominant Supplier/ Macrosocial		
Niche Market/ Macrosocial		
System Usage in Industry/ Macrosocial		
Business Integration/ Organisational	Business Vision	Organisational
Fragmented view of the Organisation/ Organisational		
IS Strategy/ Organisational		
Quality Focus/ Organisational		
Risk Aversion in Case Organisation/ Organisational		
Safety Focus/ Organisational		
Operational Improvement/ Organisational		
Operational Inefficiency/ Organisational		
Project Initiation/ Organisational		
Blood Control System/ Work-system	ES Artefact	Work-system
Data Migration/ Work-system		
Database Integration/ Work-system		
e-Financials/ Work-system		
Implementing BOSS/ Work-system		
Interim Label / Work-system		
Introducing ISBT-128/ Work-system		
MIS Reporting/ Work-system		
Special Testing Barcode/ Work-system		
System Complexity/ Work-system		
System Configuration/ Work-system		
System Constraints/ Work-system		
System Extension/ Work-system		
System Functionality/ Work-system		
System Maintenance/ Work-system		
System Maturity/ Work-system		
System Performance/ Work-system		
System Quality/ Work-system		
System Security/ Work-system		
System Terminology / Work-system		

4.3 Retroducing the mechanisms and explanation building

The final stage focused on the identification of underlying mechanisms and theory development. Compared to the coding process, this stage was more iterative and creative in nature as the analysis moved back and forth between the data and explanation. Along with the identification of mechanisms, explanation building goes hand-in-hand in a critical realist analysis. This is what George and Bennett (2005) call 'analytical process tracing'. This involved converting the codes and the descriptive narrative into an analytical causal explanation presented in explicit theoretical form. The goal here was to build an explanation of the events on *how* or *why* something happened. This phase involved a series of iterations and revisions to achieve greater explanation and theoretical coherence (Yin, 2013: p. 149). The objective was to identify the most complete and logically compelling explanation of the observed events given the specific conditions of the contextual environment (Wynn and Williams, 2012). A significant challenge at this stage was to ensure theoretical validity and (theoretical) generalisation when developing and explaining the theoretical framework. This meant ensuring that the identified mechanisms were logically consistent, were based on the empirical evidence, and were generally supported by the literature (Maxwell, 2012). However, it may be noted here that in some cases, the researcher might need to use creative or meta-retroduction (Eco, 1983) because existing theory does not offer any suitable mechanism.

Explanation building initially started with overcoded retroduction (Eco, 1983; Tsang, 2014) based on the constructs from the literature review. During the literature review it was conceived (*abduction* as in Chiasson, 2005) that the four process-mechanisms of Van de Ven and Poole (1995) – lifecyle, teleology, dialectic, and evolution – would neatly fit the bill. However, many events remained unexplained when using the four mechanisms. As an alternative, Anthony Giddens's (1984) structuration theory was explored since there was

some evidence of legitimation process. However, again the explanation remained lacking due to a relative lack of data at the macrosocial level. Moreover, there was not enough evidence for other two mechanisms – signification and domination – noted in the structuration theory. Therefore, a major challenge at this stage was to remain true to the emergent understanding and not to force any predetermined theory. This motivated the researcher to look for mechanisms across diverse literature-sets, including organisational theory and industrial economics, thereby using undercoded retroduction (Eco, 1983; Tsang, 2014). In practice, this involved looking for commonality among the second-order codes within and across levels, going back to the literature in search of suitable mechanisms that underpin the commonality, and redescription and recontextualisation of the events under consideration (*abduction* as in Danermark et al., 2002). Many candidate mechanisms were considered before finally arriving at four underlying mechanisms that formed the building blocks of the final theoretical framework. Table 3 shows the finally arrived key mechanisms and associated second-order codes with corresponding levels.

Table 3: Identification of underlying mechanism

Second-order codes/Level	Mechanism	Level
Enterprise System Market Structure/ Macrosocial	Market Mechanism	Macrosocial
IS Resource Market/ Macrosocial		
Supplier's Push/ Macrosocial		
Support from Supplier/ Macrosocial		
Business Visions/ Organisational	Institutionalisation	Organisational
Change Management/ Organisational		
Organisational Learning/ Organisational		
Other Organisational Exercises/ Organisational		
Project Leadership/ Organisational		
Project Ownership/ Organisational		
Role of IT/ Organisational		
Superusers Selection/ Organisational		
User Engagement/ Organisational		
User Exposure/ Organisational		
Workarounds/ Organisational		
BPR-Customisation/ Work-system	Affordance Mechanism	Work-system
Enterprise System Artefact/ Work-system		
Gap Analysis/ Work-system		
Hardware-Interfacing / Work-system		
IS Infrastructure/ Work-system		
Partner's IS Infrastructure/ Work-system		
Superusers' Skills/ Work-system		
External Control/Macrosocial	Control Mechanism	Multilevel
Institutional Context/Macrosocial		
Change Control/ Organisational		
Internal controls/ Organisational		
Top Leadership/ Organisational		
Change Control/ Work-system		
Project Controls/ Work-system		

It is to be noted here that while all four mechanisms are based in literature, existing literature may not use the terms 'mechanism' when using similar concepts (Avgerou, 2013; Davis, 2006), perhaps avoiding an explicit critical realist stance. Of the four mechanisms that are identified in this study, only affordance mechanism is distinctly identified as a critical realist mechanism (Volkoff and Strong, 2013) as such. *Affordance mechanism* captures as action possibilities and opportunities that emerge from actors engaging with the system (Faraj and Azad, 2012). An affordance perspective recognises how an object supports a set of business processes and constraints some other business processes (Zamutto, et al., 2007) when an organisation attempts to appropriate the technology. Since it includes aspects related to the technology and the business process, it primarily operates at the work-system level. The *institutionalisation mechanism* is conceived here as a process by which a social structure attains a stable and durable state or property (Currie, 2009) that produces recognisable, repetitive patterns of interdependent actions, carried out by multiple actors within a pre-existing social context (Feldman and Pentland, 2003). The *market mechanism* refers to product availability, market structure, buyer-supplier relationship, and the impact of these on the enterprise system lifecycle. The market mechanism was a dominant mechanism at the macrosocial level. Finally, the *control mechanism* is understood as a set of activities that are conducted in a project to regulate or adjust the behaviour of the stakeholders, to motivate participants, and to ensure that their capabilities are fully applied to advance the ES initiative

towards its objectives (Kirsch, 1997, 2004). The control mechanism operates at all three levels – work-system, organisational, and macrosocial level.

Once the underlying mechanisms were identified with a level of reasonable certainty, the last phase of the case study involved the development of an explanatory framework involving these mechanisms. In other words, the case narrative was explained in terms of the four mechanisms. The explanatory framework is not included here since it falls outside the scope of this paper.

4.4 Looking back – challenges and suggestions for applying retroduction

Based on earlier discussion, Table 4 summarises the steps, associated challenges, and offers suggestion for conducting a critical realist case study and applying retroduction for the identification of mechanisms. It is not claimed here to offer a set of best practice for applying retroduction for mechanism-based theorising. At best, these suggestions should be treated as pointers for further exploration by researcher employing the critical realist thinking.

Table 4: Challenges and Suggestion for Applying Retroduction

Steps	Challenges	Suggestions
Case selection and data collection	To include a longitudinal element in the case	Focus on the process tracing instead of focusing on a one-off event.
	To ensure multilevel data collection	Explicitly include the concept of levels in the research framework. Collect and sort data according to the pre-determined levels. Try to interview people across the hierarchy. If possible, talk to the people from outside the organisation. Collect secondary data on relevant entities/events even if they are outside the case organisation.
Presenting a 'pure' narrative	To free the narrative from any attempt of theorising	Start writing the narrative immediately after the data collection in parallel with the transcription of the interviews
Retroductive analysis	To retain the multilevel nature of the data	Use nested coding by assigning a dominant level to each code. Maintain the level of the code when grouping first-order codes into second-order codes, and second-order codes into mechanisms.
	Recursively apply abduction, induction and deduction	Make a 'hunch' on candidate mechanism based on the literature review (abduction). Assign first-order codes based on the data (induction). See if the first-order codes can be grouped into second-order codes corresponding to literature (deduction). Engage in recontextualisation and redescription using candidate mechanisms (abduction).
Identification of mechanisms and explanation building	Ensuring theoretical validity and (theoretical) generalisation	Do not try to impose specific mechanism/theory if your data does not support it. Be open to the possibility of using different mechanisms available in your and other disciplines. Engage in a series of iterations and revisions to achieve greater explanation and theoretical coherence.

5. Conclusion

There are calls in business research literature to look beyond the positivist and interpretivist traditions and to consider other research philosophies. Taking a cue from the realist turn (Ackroyd and Fleetwood, 2000; Fleetwood and Ackroyd, 2004) and the calls for mechanism-based theorising (Anderson et al., 2006; Avgerou, 2013; Campbell, 2005; Davis, 2006) in business research, this paper outlines the application of multilevel retroduction in a critical realist case study. The process of retroduction is demonstrated through an illustration of a multilevel coding and analysis process for the identification of mechanisms. A key implication of mechanism-based theorising is that it directs over focus away from the surface-level events and shifts it to underlying mechanisms that cause those events. The managerial implication is that managers can focus on interacting with underlying mechanisms rather than trying to manage empirical level events. Apart from ES domain, another ripe area for the mechanism-based theorising would be organisational change, paving a way for contextual and processual understanding of change (Pettigrew, 1997; Pettigrew, Woodman and Cameron, 2001).

The main takeaway from the paper is that the design and retroductive analysis in a critical realist case study should be sensitive to the longitudinal and multilevel elements of the research problem. During case selection, the focus should be on the process tracing instead of focussing on one-off events. It certainly helps during the data collection and analysis process that the research framework explicitly incorporates the concept of levels, such as the one employed in this study. The coding process should retain the predetermined levels of the first-order, second-order, and when identifying a mechanism, which could then be a single level or a multilevel mechanism. Since the process of retroduction includes employing abduction, induction, and deduction in a recursive manner, the process of developing explanation is iterative in a critical realist case study. Another learning is that the whole exercise should not be bound by disciplinary boundaries and should be open for revision based on emerging understanding of the researcher.

While this paper does not claim to provide a set of best practice for multilevel retroductive analysis, it hopes to sensitise (and possibly lure) business researchers to explore the critical realist perspective and to employ retroduction for mechanism-based theorising. Due to a technological element, this research used the socio-technical framework for data collection and analysis. Future research in this area could focus on the application of other multilevel frameworks depending on varied context. Furthermore, this paper did not explore the interaction between the mechanisms. Future research direction would focus on providing methodological guidelines and managing the research complexity when the interaction among mechanisms is being studied for a more comprehensive understanding of the phenomena.

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