

Value Creation from IT-Based Knowledge Management: A Theory of Symbiotic Relationships

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Abstract

Knowledge management systems (KMS) support the acquisition, codification, transfer and application of organisational knowledge as part of KM initiatives to generate organisational value. Current research on the value of IT-based knowledge management is still emergent and focuses on the assessment of the impact of KMS on organisational performance. The results are conflicting and inconclusive and do not explain how and why KMS generate value for organisations. To address this question, the study utilises a critical realist approach to conduct two in-depth case studies of large financial institutions that have implemented knowledge management systems. Drawing on the concept of affordance as an analytical construct, the study identified generative mechanisms for value creation from KMS.

This study contributes to knowledge in two significant ways. First, it extends our understanding of the concept of value with particular emphasis on the value of knowledge at the micro and macro levels. The thesis presents an instantiated value taxonomy and proposes a multilevel value interaction model introducing the concept of value capture. Second, the study has addressed the main research question of how and why KMS create value identifying four high level generative mechanisms and revealing the dynamic nature of value creation and the symbiotic patterns of interplay between IT and organisational mechanisms. The study also reveals how KMS destroy value through inconsistent actualisation of the affordances, absent affordances, and harmful interdependences between generative mechanisms.

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List of Abbreviations

- BCP Business Continuity Planning
- CAR Cumulative Abnormal Return
- ELS Electronic Lending System
- ERP Enterprise Resource Planning
- EV Exchange Value
- HC Human Capital
- KBC Knowledge Based Capital
- KBV Knowledge Based View
- KM Knowledge Management
- KMIT Knowledge Management Information Technology
- KMS Knowledge Management Systems
- OECD Organisation for Economic Cooperation and Development
- RBV Resource Based View
- SC Social Capital
- SCV Single Customer View
- TSIA Technology Services Industry Association
- UV Use Values

Chapter 1 Introduction

1.1 Research Background

1.1.1 IT-Based Knowledge Management

Knowledge is recognized as a strategic asset by practitioners and researchers and its effective acquisition and utilization is the main source of competitive advantage (Schiuma et al 2012, Heisig et al. 2016). The latest report by the Organisation for Economic Co-operation and Development (OECD) argues that knowledge based capital is the main source of growth in the current economic environment and it encourages investments to improve competencies and skills of employees and increase productivity (OECD 2013). Knowledge management is an organizational practice of capturing, sharing and effectively using knowledge to achieve organizational goals. A survey of two hundred senior executives from 158 global firms shows that 80% of the companies have implemented knowledge management initiatives (Hackett 2000).

The majority of knowledge management initiatives are supported by technology (Hackett 2000). Knowledge management systems (KMS) are a category of information systems which support the collection, codification, sharing and application of organisational knowledge as part of KM initiatives (Alavi and Leidner, 2001). KMS include IT capabilities that extend and support knowledge management processes in various forms. Early publications (Davenport et al. 1998) presented the potential of technology to store and share structured knowledge through knowledge repositories of external and internal knowledge and connecting people through expert directories. However, IT can also support communication and sharing through communities of practice, supporting organizational memory through codifying lessons learned, and knowledge application through incorporating knowledge in workflow and other process-based systems.

In pursuit of realized potential of KMS, many companies have made significant investments in technology solutions for knowledge management (Hackett 2000). This investment is rapidly rising with US companies reporting USD 259 million invested in 2019 compared to USD 99 million in 2015 (www.viable.com). These figures include only

the purchase of technology and there is further investment in implementation, maintenance of knowledge and organizational initiatives to encourage employees' participation. However, reports from practice and academic research show that KMS investments have led to limited success and many organisations have abandoned implemented KM initiatives (Hackett 2000, Coakes et al. 2013). This has led to questions if knowledge management is dead, and if not, then it is "gasping for breath" (Davenport 2015).

Strong statements about the demise and decline of knowledge management are based on the assumption that the main purpose of KM is content management (Davenport 2015, O'Leary 2016). They are justified by problems with searching and retrieving knowledge, issues with storage technology, and lack of motivation from individual employees to contribute to repositories. However, industry reports and academic research suggest that knowledge management has evolved from treating knowledge as an object through content management to a social view of knowledge and a shift of KM technologies to support the flow of knowledge and collaboration (Hackett 2000, O'Leary 2016) and there is increased interest in it. Therefore, authors suggest that instead of considering the question if KM is dead, the real question is "what is the value of knowledge management?"

1.1.2 KMIT Value Creation

There is evidence of impact of investment in IT-based KM (KMIT) on external value. In their analysis of share response to announcements of IT based KM efforts, Sabherwal and Sabherwal (2005) found that the firm's stock market value measured by the cumulative abnormal return (CAR) was positively associated with the announcements and this demonstrates that investors recognize the value of KM initiatives. In a study based on annual accounts of Spanish banks, Martelo-Landroguez and Cepeda-Carrion (2016) found that knowledge management processes had a positive effect on market share, sales volume, profit labels and margins, and ROI.

Other studies find that there is no significant relationship to external financial performance but IT-based KM initiatives affect internal operational or intangible

performance. Zack et al. (2009) found that KM practices had a significant relationship with cost reduction, product innovation and quality, customer loyalty and retention. Cohen and Olsen (2015) found that IT based capabilities have an effect on customer service but not on financial performance. Andreeva and Kianto (2012) find that there is a significant negative relationship between IT for KM and financial performance but there is a positive relationship with competitiveness measured by perceived improvement in market share, profitability and growth. This implies that KMIT is seen as expenditure by the respondents but influences the external perception of companies.

Finally, some studies viewed organizational capabilities as an intermediate outcome mediating the effect of KMIT on organizational performance. Lee and Choi (2003) found that there was no significant relationship to organizational performance but there was contribution to the codification capability as an intermediate value. Lee et al. (2012) examine and confirm the positive relationship between KMS and creative organisational learning as measured by the improved ability to review and challenge existing business practices. Wang et al. (2016) include the elements of intellectual capital (human, structural and relational capital) as intermediate outcomes of knowledge sharing which then in turn positively influences operational and firm performance. This suggests that knowledge as an asset grows through knowledge sharing and it is both an input and output of KM.

The discussion in this section to this point outlines studies addressing the question “What is the impact of KMS?” but it does not explain how this impact is achieved and why sometimes value is created and sometimes not. There are very few conceptual or empirical studies on how and why value is created. One stream of research aiming to address this question examines the effect of contextual organizational factors and another emerging stream has studied the complementary nature of IT and organizational capabilities in their influence on performance.

Studies considering enabling organizational factors have included them as antecedents to IT for KM, as organizational capabilities mediating the relationship between KMS and performance and as independent factors examined together with IT. Chuang et al

(2013) investigated the role of organizational culture, structure and incentives as enablers of KM IT support and concluded that these organizational factors improved the extent to which IT can support KM initiatives. Tan and Wong (2015) included culture and leadership as formative items in the same construct (KMF) with infrastructure and technology and found that as a whole these factors positively affected manufacturing performance. Finally, Cohen and Olsen (2015) investigated the role of business strategy as a moderator of the relationship between IT based KM capability and customer service.

Building on conceptual work categorizing KM practices, authors have applied the universality perspective including IT-based and HR-based practices in their models and have considered their impact independently (Andreeva & Kianto 2012, Cohen & Olsen 2015). Then they have used different methods to represent a complementarity perspective to investigate the role of the two practices when they are combined. Andreeva and Kianto (2012) found that when considered independently, IT-based KM practices have a positive relationship with competitiveness but a negative relationship with financial performance. The study then tested the relationships as mediated by HR-practices and the results showed strong positive relationship with both performance measures. Cohen and Olsen (2015) considered IT-based and HR-based practices separately and as a combined construct. The combined factor had a stronger relationship with customer service but in both cases there was no support for a relationship with financial performance.

1.2 Motivation of the Study

The brief overview of the literature above shows that the field studying the value of KMS is still emergent and fragmented. There are contradictory and conflicting directions and results. Surveys of practice in organisations demonstrate rise in investments and perceived value of KM initiatives but there are also reports that interest in IT-based knowledge management has diminished. Share values increase in association with announcements of implementations of knowledge management programmes but the findings from research on the impact of KMIT are inconclusive with evidence failing to support contribution to tangible value. Multiple conceptualisations

and inconsistent results prevent us from building a cohesive and coherent body of knowledge that improves our understanding of how KMIT creates value. This section draws on conceptual work from the IT value literature and other disciplines to identify gaps in the KMIT value research and offer directions for addressing the gaps.

The first area for consideration is how value is conceptualised. Drawing on economics, management and IT literature, value is a multifaceted concept, which can be relational or non-relational (Bowman & Ambrosini 2010, Schryen 2013). Use value is the perception of worth or novelty of a product or a service and this perception is relational as different users and stakeholders will assess it based on their needs and goals. Non-relational or objective value is the monetary value that someone pays for the product or service and it is captured by the firm (Bowman & Ambrosini 2010). Value can be created and captured at many levels – individual, group, process or organizational level. The IT value literature recognises that IT manifests itself in these multiple ways (Kohli & Grover 2008) and authors have argued for the need to study different measures and the interactions between them. However, the majority of IT value studies focus on organizational performance predominantly assessed by economic measures. All reviewed studies in the KM literature have assessed the impact of KMIT on performance measures at organizational level. The multiple measures used can be categorised as tangible (e.g. profit, market share, cost reduction), intangible (e.g. customer satisfaction, human capital). Studies have combined values such as operational performance and market share in one construct and in doing so have confused the internal and competitive value dimensions (Chuan et al. 2013, Abusweilem & Abualoush 2019). Few studies have considered intermediate values such as customer service mediating the impact on financial performance (Zack et al. 2009, Cohen & Olsen 2015). The great majority of studies, which include monetary measures such as profitability and market share, have not used the actual objective measures but the perceptions of the respondents (Lee & Choi 2003, Andreeva & Kianto 2012). In conclusion, there is confusion about the value construct due to inconsistent conceptualisations and neglect of intermediate values, intangible market values, individual and process levels, and the relationships between these values. Therefore, the first gap is in our understanding of a comprehensive and consistent value concept

and the relationship between individual and organisational, internal and external values. The direction of this study will be to distinguish between different manifestations of value in the three dimensions of level, relationism, and internal versus external capture.

Contradictory results and conclusions on the value of KMS can also be attributed to inconsistency of the operationalization of KMS or KMIT (used interchangeably in the literature). One of the issues is the aggregation of KMIT at the organisational level mirroring the IT value literature. Aggregation at the organisational level means that wide ranges of assets are grouped together incorrectly assuming homogeneity – different types of systems, infrastructure and capabilities. This compromises the results as different systems will affect different measures of performance or they will affect them to a varying extent. For example, systems, which support codification, are more likely to affect service quality or efficiency while knowledge sharing systems have the potential to increase human capital and innovativeness. The availability of infrastructure on the other hand may be treated as an expenditure and have a negative impact on financial performance. Another serious issue is how clear the measures of the KMS asset are. A few studies have adopted the KMIT support construct as representative of KMS (Lee & Choi 2003, Lee et al. 2012, Chuang et al. 2013). The conceptualisation of KMIT support varies widely from support to a single process such as codification to simply the existence of IT support without it being related to KM. It can be interpreted by respondents in multiple ways by respondents as capability, infrastructure, an ecosystem of several KMS or a single KMS. Therefore, there is a gap in the current literature in the operationalization of the KMS concept. This study will pursue the direction suggested in the IT value literature of disaggregating the IT artefact to a single asset or a specific type of system.

The literature on KMS value focuses exclusively on measuring the impact of KMS on performance through associations. This approach targets the question of what is the impact or value generated from a resource but does not explain how and why the value is created. Prior research in management suggests interaction between human agents and infrastructure creates value through activities to capture use and exchange value, increase capital stock or maintain the business (Lepak et al. 2007, Bowman & Ambrosini

2010). Supporting this proposition, there is limited evidence that human development practices in organisations mediate the relationship between KMS and performance. In the context of IT value, authors have suggested that IT cannot create value in isolation and IT value is a synergistic outcome from complementary relationships between the IT resource and other organizational resources and capabilities (Nevo & Wade 2010). However, it is not clear how these synergies play out and there are no causal explanations of how and why the synergistic outcome materializes. Furthermore, as most IT value studies are based on the Resource based view of the firm (RBV), they assume best use of resources and that the use of resources. However, research in economics, marketing and management has identified that there are value destroying as well as value creating activities employed in organisations (Bowman & Ambrosini 2010, Pie & Caceres 2010). In conclusion, value creation is a black opaque box between resources/capabilities and value. Authors have argued for the need of practical, and conceptual contributions towards understanding of the dynamics through knowledge-based IT resources create value. Therefore, there is a gap in our knowledge as to how and why KMS create and destroy value.

One approach, to addressing the “how” and “why” questions, is to identify generative mechanisms for value creation provided by the KMS. Mechanisms have been the basis for theory development in many disciplines and more recently in the IS literature (Volkoff & Strong 2013). Mechanisms are objects’ capacities for behaviour (Bygstad 2010). This capacity means that a mechanism has the potential to cause an event but may not do so. A mechanism is defined by the effect it produces and consists of structural elements, their relationships and context and the associated power to cause an effect. Mechanisms can be generated from a structure, from interactions between structures or interactions between structures and actors (Volkoff & Strong 2013). Mechanisms can be transformational (micro-macro), situational (macro-micro) or action-formation (micro-micro).

In the management literature on value creation, Lepak et al. (2007) identify two mechanisms (competition and isolating), which determine how value is captured. The creation of a novel product or service will initially capture higher value as there will be lower supply than demand. However, as competition increases, other firms imitate the

product and the supply is not limited or concentrated to one firm, hence the value of the new product development will be captured by many firms. A similar situation can be presented at the individual level if an employee innovates and creates a new task, product or service. Initially they will be able to capture the value in the form of increased remuneration or other additional benefits. If their skills are readily available, then there will be increased competition between individual employees, which reduces their captured value. Isolating mechanisms create barriers to replication, which can reduce competition and ensure that the majority of the value created is captured by the creator. These mechanisms are of relevance for the introduction of knowledge management systems as individuals are expected to contribute their intellectual capital through knowledge sharing and knowledge creation systems. If they do not see value capture from it, they can engage in isolating mechanisms and resist the use of KMS to increase their value capture.

In the context of knowledge management, Grant (1996) proposes coordination as a mechanism for integrating knowledge. In his seminal paper proposing a knowledge-based theory of the firm Grant (1996) argues that to create value from knowledge, the main goal for the firm is knowledge application. The theory is based on the assumptions that knowledge resides in people, organisations gain from specialisation and that producing goods and services requires a range of specialised knowledge as input. Given these assumptions, the goal of the organisation is then to integrate the knowledge of many individuals and coordinate their activities. Grant (1996) also builds on research from institutional economics to caution about potential lack of cooperation between individuals with conflicting goals and argues for the need of a cooperation mechanism. This highlights the role of the individual in creating value, and the need to study the value capture at individual level. However, this conceptual work has not been developed further and there is no empirical work on revealing the mechanisms that create value.

High-level mechanisms are helpful in generalizing how effects are produced across contexts. In the IS literature Bygstad (2010) conducted an in-depth critical realist case study to identify the innovation mechanisms provided by information infrastructure. The study identified two high-level mechanisms of innovation and service, which

included steps, structures and context. However, these high level mechanisms do not reveal the detailed interactions and dynamics of how a specific technology can cause an organisational change (Volkoff & Strong 2013). Volkoff and Strong (2013) propose the concept of affordances to enable the development of mid-range theories and provide finer granularity.

An affordance is defined as the potential for action from the relation between an actor and technology to achieve an immediate concrete outcome. An affordance is an existing potential for action but its actualisation depends on the context, the goals and competence of an actor (Volkoff & Strong 2013, Seidel et al. 2013). Affordances are elements of higher-level mechanisms, and a mechanism can arise from the interaction of affordances (Bygstad et al. 2016). Therefore, affordances allow us to study mechanisms generated specifically from the interaction of technology and human agents and allow us to reveal the context that enables and constrains the mechanisms. This study will adopt the affordance approach to identifying mechanisms as it allows finer detail description of the relationships between function, structure and identity. It also allows the researcher to distinguish between different technologies and different contexts. Then the affordances will be generalised into higher-level mechanisms. This approach addresses the gap of understanding how and why KMS create value, as it will allow the identification of the role of the technology, the individual and organisational contextual factors and the intermediate outcomes resulting from affordance actualisation.

1.3 Research Objectives

The overview of the literature has presented the main findings from research in KMIT value creation and the gaps in current knowledge. Based on the findings it is clear that the value creation process is not a direct and linear path from KMIT to value, it involves interaction between human actors, IT and organizational structures and interventions. The question that is left unanswered is: how and why KMS create value, what causal structures lie in KMS leading to value and what is the link of interrelated mechanisms connecting KMS and value. There is need for contextual studies to contribute to and build explanatory theories of value creation. Research needs to consider the creation

and capture of internal and external value at micro and macro levels, causal paths to planned and unanticipated value outcomes. In conclusion, the research objective of this study is to develop a theory to explain how KMS create value which recognises the role of individuals and their actions, the role of the IT artefact and the organizational structures.

The associated research question is: How can KMS provide generative mechanisms for value creation?

To understand how KMS contribute to value creation, this study aims to study the interactions between individual actors, the KMS and organizational structures to provide empirical evidence of how immediate concrete value outcomes are achieved. The aim is to provide evidence also on the releasing and constraining conditions. The approach is then to integrate the data, abstract the individual actualisations to organizational affordances and mechanisms and develop a theoretical model including functional affordances.

To understand the dynamic nature of value creation, this study aims to examine the interaction of mechanisms across levels. Previous studies in other contexts have derived individual high-level mechanisms to achieve generic frameworks and relative generalizability. However, this obscures the fact that there are a number of mechanisms in complex socio-technical structures and they are not performed in isolation. Empirical evidence on the interaction of mechanisms may reveal interdependencies and mechanisms acting as releasing and constraining conditions (Bygstad 2016).

1.4 Research Approach

The underlying assumption of this study is that the role of information systems varies depending on the type of system and the organisational context where it is introduced, as affordances and mechanisms associated with a system interact with other organisational structures and mechanisms. It draws from the concept of affordance, which represents the opportunity for action that the system provides (Volkoff & Strong

2013). Consequently, an affordance is a relational concept as the object (IS) can have different affordances for different actors, pursuing different goals and abilities and perceiving different opportunities in the same feature of the artefact.

The research approach to address the research question will be to conduct two intensive critical realist case studies of large financial institutions using an organisation-wide knowledge management system (KMS). In particular, the case studies will examine the role of KMS in generating value at the individual and organisational level. The case study material will be collected from semi-structured interviews, observations, and documentation. The data will show how the participants view the collaborative system, their interaction with it, what has enabled or constrained their interaction and the resulting value outcomes. The aim is to examine generative causality, i.e. the powers and the interplay of relevant mechanisms leading to particular events.

To identify generative mechanisms, which can explain value creation and delivery, the stepwise framework for critical data analysis (Bygstad et al. 2016) will be employed. Using retroduction from immediate concrete value outcomes (Bhaskar, 1978), the interaction of the human and technical entities will be analysed to identify the individual actualised affordances which are components of the generative mechanisms offering the potential to generate value from the specific system and explain how and why different value outcomes are achieved under specific circumstances.

1.5 Contributions to Knowledge

The main goal of this study is to advance our understanding of the role and contribution of KMS to value creation in organisations. Understanding how KMS are used to create value at individual and organizational level will explain why the same system can produce different results by different users or in different organisations. The study will contextualize the effects of information systems in the context of knowledge management initiatives to provide evidence of the social and technology conditions required to enable value creation. This improved knowledge can help the design of systems and organizational structures for the success of knowledge management initiatives. The empirical evidence of the technology contribution will also help reconcile doubts about the potential of technology solutions for knowledge

management. This section outlines the expected contribution of the study.

1.5.1. Theoretical contributions

This study aims to uncover the black box of value creation and provide a rich picture of the dynamic interactions of human agents, social and physical structures that produce value outcomes. This evidence will develop our understanding of the role of technology in creating internal and external value. The affordance approach employs retroduction from immediate concrete outcomes to create causal paths from the specific interaction to intermediate and final outcomes. This will resolve the issues with attribution of value.

Affordances are relational and contextual and they allow for differences in the role of different technologies in different organizational context to provide rich detail of the relationships between the structure, function and identity. They represent the entanglement of the social and technical elements but allow them to exist separately. Affordances are building blocks of larger causal structures of mechanisms, which can be generalised. Identification of the mechanisms can help to build a mid-range theory to explain the causality of value creation, which is specific to the type of technology but provides a level of generality across specific cases (Volkoff & Strong 2013). Therefore, one expected contribution of this study is to identify and understand the mechanisms that generate value from knowledge management systems and therefore to propose a mid-range theory of KMS value creation. Affordance theory allows for consideration of multiple levels through the micro-macro mechanisms and therefore, the proposed theory will address the need for multi-level IS research.

Affordances are the potentials for action, which lie in the relation between the artefact and the actor. The potential for action exists in the real domain independently from the specific actor. However, whether and how this potential is realised in the actual domain depends on the enabling and constraining conditions. Different conditions may lead to the actualisation of different affordances or the same affordances in a different way and lead to different immediate concrete outcomes. These conditions may be at the individual level (e.g. competency), organisational level (structures, culture) or lie with interactions of mechanisms. This study aims to provide observed evidence in the

empirical domain of the influence of enabling and constraining conditions in the context of a specific observed actualisation of an affordance. This evidence will develop better understanding of the reasons why different outcomes are produced by the same system even within the same organisation. This will advance our understanding of the organisational and individual factors that are specific to outcomes and affordances. It will address the gap of identifying complementaries of IS assets, IS capabilities and socio-organisational capabilities (Schryen 2013).

Current research on the impact of KMS and IS largely assumes best use of resources and that such use produces positive outcomes. However, empirical studies suggest that there may also be negative and positive unexpected outcomes. This study aims to provide evidence of different observed outcomes and how they relate to intermediate and final value. For example, it may identify value-destroying interactions with KMS. In contrast, it is also possible to observe unexpected positive outcomes when the actors perceive affordances in the system, which were not considered in its design. For example, the designed and expected use of keys is to unlock doors but there has been publicised use of keys as a self-defence weapon. Similarly, there may be latent affordances in KMS, which were not planned for.

The literature currently aggregates KMS at organisational level and therefore it does not provide knowledge of the relative importance of specific systems. Identifying consistent functional affordances of KMS producing value outcomes will improve our understanding of desirable affordances of knowledge management systems. This may inform the design of systems and organisation structures to prioritise the support of these affordances.

Finally, value is an ambiguous and ill-defined construct in the KMS and IS literature. Identifying immediate concrete outcomes and subsequent value derived from them would allow a clear typology of internal, external, intangible and tangible values. It will distinguish between internal cost saving value and external value to customers and shareholders. It will link the perceived values to stakeholders and will help to understand their priorities for value capture. It also will allow the representation of value as a multi-level concept including relationships between the levels.

1.5.2. Contributions to Practice

Generating value from investments is critical for the competitiveness and survival of organisations. This study has implications for the selection and prioritising of knowledge management systems. First, it aims to identify categories of value outcomes created by the use of knowledge management systems and this provides evidence of the value generated, and it will link the value to IS capability. This will inform investment decisions on the requirements for KMS purchases, development and improvements. It will facilitate the preparation of better informed, more informative and comprehensive business cases including not only financial measures but also measures of intangible values. For example, the literature has suggested that building and improving human capital is one of the value outcomes of knowledge management initiatives but there is no evidence that this value is considered as justification for introductions of KM systems. Finally, there are implications for the selection of specific KMS solutions as the functional affordances can be used as criteria for selection from alternative solutions.

The findings of this study have the potential to improve the design of knowledge management system. Identification of actualised and functional affordances that contribute to value creation has implications for how KMS can be designed to support value-generating mechanisms. It may identify affordances, which have been missed or not actualised. It also allows for the association of material properties to affordances and therefore, can translate affordances to specific features required. Affordances as potential for action are more useful for designers than features as they can communicate the goals and needs for action and allow for an easier communication with potential users and a better-informed design. Providing a set of affordances abstracts the design from specific technology solutions. In addition, it may identify affordances that are specific to knowledge-based information systems.

Finally, this study has implications for the successful introduction and management of knowledge management systems. This study will identify contextual factors at both micro and macro levels and it will inform the organisational design of KM initiatives in synergy with the technical solution. For example, there are conflicting results in the

literature on the role of incentives and organisational structure to encourage long-term engagement with and use of KMS. The evidence in this study will relate contextual factors to specific instances of use and will develop an understanding how organisational capabilities complement specific KMS capability. This can inform the design of organisational interventions, which are most helpful for value generating interactions.

1.6 Thesis Outline

The thesis is organised into chapters as follows:

Chapter 1 – This chapter provides a brief overview of relevant prior research to ground and motivate this study and presents the research objectives, research questions, research approach and expected contributions.

Chapter 2 – This chapter reviews current research on value creation from perspectives of economics, management, information systems and knowledge management. The literature review synthesizes conceptualisations of value, value creation and value capture to provide the basis of the core themes to be used in the study. It also analyses findings of empirical work to identify gaps in the current knowledge and formulate directions for the research.

Chapter 3 – This chapter overviews the research approach, methodology and design to address the research question. First, it reviews approaches to study causality and justify critical realism as the philosophical perspective and affordance theory as the theoretical foundation of the study. The research design outlines the research method, case selection and data collection process and protocols, and data analysis framework.

Chapter 4 – This chapter presents the findings of the analysis of Case 1 employing the critical realist data analysis framework (Bygstad et al. 2016). The results are organized to identify affordances, value outcomes, generative mechanisms, interdependences, enabling and constraining conditions.

Chapter 5 – Similar to the organisation of chapter 4, this chapter presents the findings of the analysis of Case 2 employing the critical realist data analysis framework (Bygstad et al. 2016).

Chapter 6 – This chapter presents a case-to-case synthesis providing aggregated analysis and in depth discussion addressing the research questions.

Chapter 7 – This chapter summarises the main findings, and how they build on and extend the existing knowledge. It outlines the contributions to theory and practice, limitations of the study and discusses the potential for future research work.

Chapter 2 Literature Review

The 21st century is described as a knowledge economy and knowledge workers are the most valuable assets of organizations (Drucker, 2000). Knowledge is needed to deal with complexity, to provide value-added services and to encourage innovation. Achieving sustainable competitive advantage is only possible through what an organization knows, how it utilizes and how fast it can learn something new (Prusak, 1997). Knowledge Management is an approach that was developed to leverage this new core resource. Knowledge management (KM) aims to help employees effectively create, share, and utilize knowledge to enhance the organisation's knowledge (Jashapara, 2004). Knowledge management systems are a class of information systems, which support the collection, codification, sharing and application of organisational knowledge as part of KM initiatives (Alavi and Leidner, 2001)

Companies have invested millions of dollars in knowledge management systems to facilitate the storage and flow of knowledge within the organization. This investment is rising with one survey of US companies reporting USD 99 million invested in KM technology in 2015 and rising to USD 259 million in 2019 (www.viable.com). These figures do not even represent the full investment as they relate only to the purchased technology. However, investing in technology to support knowledge management does not ensure either initial or long-term value for the organisation. KM systems are often perceived as “glorified information systems” as there is a gap between their promise and what they deliver (Geisler, 2008 p 255). Industry reports suggest that KM technology has not lived up to its potential with one study reporting that an average large business loses USD 47 million per year due to inefficient knowledge sharing (www.panopto.com). The study suggests that the issue is not necessarily with the technology, but with people without elaborating on the issues. Many organizations, which have invested in KM systems, have realised that knowledge management is not a one-off investment but a continuous process (KPMG Survey, 2003). Still, one of the basic knowledge management questions is about how organizations can turn the knowledge that they have into something that adds value. (Tissen, Andriessen, & Deprez, 1998 p 43)

The causal relationship between investments in KM initiatives and the generated value has not been explained. To set the agenda to address this broad question, this chapter reviews the body of current research on value creation through knowledge management to define the fundamental concepts, outline the main themes, identify unanswered questions and set a path for addressing

these questions. The first section reviews the literature on value and value creation to define what value is from different perspectives and how it is created, followed by a review of the literature on IS business value, as there is a large body of knowledge and KM systems are a subset of information systems. The chapter ends with the discussion of the KM value research and the specific questions raised within this context.

2.1 Value

In order to understand the process of value creation from KM systems, it is important to first understand what value means. Value is a concept that is not well understood and there is no agreed definition in the literature (Fischer et al 2011). The accepted definition according to the Cambridge English Dictionary is that 'value is the amount of money that can be received in exchange for an object or the importance/worth of an object for someone'. There are many perspectives of value and the literature refers to different phenomena. Current philosophical thinking distinguishes between non-relational (objectivist view) and relational value (subjectivist view). Non-relational value is impersonal and some objects possess it for its own sake, independent of the judgement and attitudes of subjects. The subjectivist view on value is that it is dependent on the attitude of a subject and it is relative to some notion of goodness for the subject.

Classical economics distinguishes between two main aspects of value: *use value* and *exchange value* (Bowman and Ambrosini 2000). Use value refers to the perception of users of the quality of a product or a service as compared to their needs. Use values (UV) are properties of products and services which provide utility. Use value is a subjective measure as it is based on the perception of worthiness (Pitelis 2009). Exchange value refers to the monetary amount that the user pays to the seller for the use value. Therefore, the value created by a product, service or a task is relative depending on the subjective assessment of a target user at individual, organisation or society level. Organizations *create* perceived use value and when products are sold they *capture* exchange value.

As assessments of the use value are made by the individual users, they are subjective. Qureshi et al (2006) state that things have value when people consider them useful, important or desirable. This definition confirms the notion that value is a relative and context-based concept. Lepak et al. (2007) suggests that the degree of perceived value by a user depends on the perceived novelty and appropriateness of the product or service. The novelty and appropriateness of a product or service

will be evaluated differently by different users depending on their level of knowledge of the product and the existing alternatives, and the meaning of the new product/service in their context. An important implication of this definition of value and its subjective and context-specific nature is that there will be competing views on what is valuable among different users of value.

Considering the various perspectives and interests of organisational stakeholders, value holds different meanings to these groups (Bowman & Ambrosini 2010). From a customer perspective, they pay a price (EV) for a product or service which has a perceived UV in monetary terms according to their judgement. The positive difference between the EV and the monetary UV is the consumer surplus or “value for money” (Bowman & Ambrosini 2000). Therefore, for a customer, the value is maximised by increasing the UV of the product or service. From a supplier’s perspective they offer a product which has a UV to their customer in exchange for monetary payment (EV). The product will not hold a UV for the suppliers - their value is in maximised EV. From a shareholder’s or owner’s perspective, shareholders offer payment (EV) in expectation of a higher monetary return (higher EV).

Firms aim to offer customers greater consumer surplus (value) than their competitors. The resource based view (RBV) of the firm argues that the main source of sustainable competitive advantage are resources that are valuable, rare, imperfectly imitable and non-substitutable (Barney 1991; Bowman&Swart 2007). Valuable resources that are unique generate economic rents (Noe, Colquitt, Simmering, & Alvarez, 2003 p 227). According to Barney’s original article (Barney 1991), competitive advantage is represented by efficiency and effectiveness (increased value). Therefore, according to the resource-based view the value lies both in the sources (valuable resources) and the outcome they explain but it is not clear how “value” has a different meaning in the explanans and the explanandum (Kraaijenbrink et al. 2010). In addition, the definition of a resource is very broad; it includes assets, capabilities and processes and therefore does not distinguish between resources. For example, it does not make a distinction between stocks that are required as inputs and capabilities that are required to deploy the resources to generate value.

Bowman and Ambrosini (2009) distinguish between the use values of separable and human inputs. Separable inputs exist separately from people and include materials and artefacts owned by the organization. These inputs hold a utility value but they cannot self-expand, therefore they cannot

create more value than what they already embody. Human inputs are in the form of performed services or activities and the utility values of human inputs can also include the capabilities of employees to perform tasks based on experience and learning. Human inputs have the ability to create new utility values. For example, employees can derive new ways of deploying separable inputs and this newly created value is attributed to the human inputs. This view implies that employees can generate new utility values through their organisational practices and interactions with material inputs. The distinction between human and separable input introduces a limitation on the pure exchange view between suppliers of human inputs and the firm. Separable inputs have a fixed UV and the exchange is based a calculation between the UV and EV. With human inputs, there is more uncertainty to the UV and Bowman and Ambrosini (2010) argue that the relationship between the firm and the suppliers in this case is more complex and relational.

The firm as a business unit can be both a supplier and a customer and will have the same perspective on values as the above groups. As a customer it will aim to maximise the consumer surplus and as a supplier it aims to maximise the consumer surplus they offer their customers and subsequently the EV derived from them. In their relationships with investors, firms are generators of increased EV. Bowman and Ambrosini (2010) argue that firms prioritise investors' interests and for them value is represented by returned profit or retained EV.

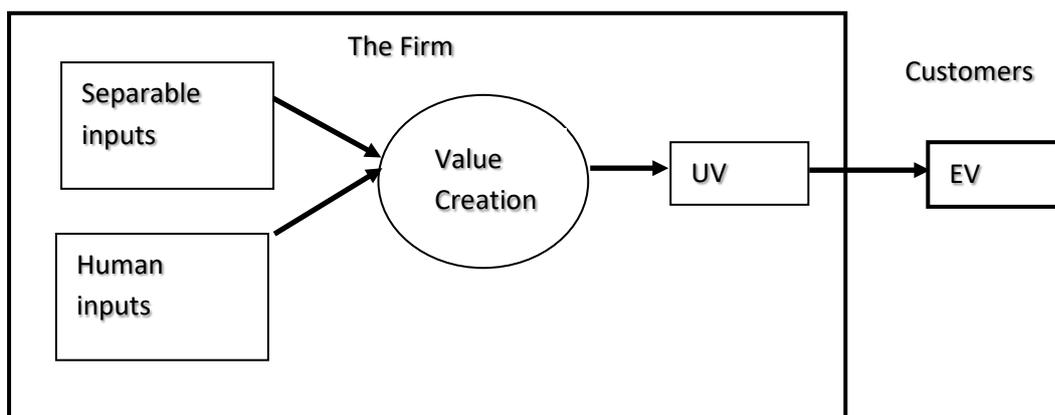


Figure 2.1 Sources and Outcomes of Value Creation

Value can be perceived from a *target user* that is not a direct internal or external customer. The purpose of the organization is to create value to many targets. One of these targets from the perspective of social responsibility is society. Post & Sachs (2002 p 16) argue that organizations

should not survive if they do not take responsibility for the well-being of society as a whole. Organizations realise that how they do business impacts on society and in return society responds to this impact. Societal value has to be visible. There is a shift from concentrating on value to a select group (shareholders) to addressing issues of the society in which organizations operate (Tissen, et al., 1998 p 57). Organizational value can be extended beyond financial value and profit to include the impacts to society and the environment. Society's perception of value may lead to a decision to purchase a product or a service and therefore businesses affect their long-term profits by the way they interact with society (Marker, Johnsen, & Caswell, 2009) Performance improvement practitioners professionals seek to extend the measurement of organizational value beyond the financial to include the impacts to society and the environment. Marker et al. (2009) argue for the need of proactive planning in terms of social and environmental impacts rather than a reactive approach to negative impacts. In support of this argument they have cited studies showing that companies with sophisticated and comprehensive climate change strategies outperform financially their competitors. In addition to impacts on the planet, the authors recognize the significant impact of organizations on society. Society's perception of value may lead to a decision to purchase a product or a service and therefore businesses affect their long-term profits by the way they interact with society. Societal indicators of value include wage levels, quality of life, job availability, educational opportunities, and community involvement (Marker, et al., 2009)

In conclusion, value can be relational (e.g. UV) or represented in monetary terms as exchange value. It is subjective and context-specific. In the context of firms generating and capturing value, value has different meanings for the groups of stakeholders and it informs their motivations and relationship with the firm. Although this discussion assumed business entities, value can also be viewed at the individual level of a customer and here the consumer surplus will be different for individuals as they will estimate the UV of the product or service differently. The inputs required to create value can be separable, or human inputs can expand their value while the value of separable inputs is fixed. To create value, a firm will perform activities which aim to maximise the EV from customers and the UV captured from suppliers. The following section will review the literature on value creating activities.

2.2 Value Creation

The literature on value creation at organizational level views value from different perspectives and considers different ways in which organizations can create new value or *value creation processes*. Porter (1985) states that companies create new value when they find new ways of doing things by using new technologies, methods and raw materials. The innovation process changes or establishes new valuation of the use or exchange value of the product or service. Lepak et al (2007) argue that value creation processes include all activities that result in a greater level of novelty and appropriateness for the target users that they would be willing to exchange monetary value for. However, they suggest that the activities will vary depending on the context in terms of the level of the source and the target of value. When the source is at the individual level, then the value creation activities relate to interactions with the environment motivated by the individual's attributes and motivation. When the source of value is the organisation, then they suggest that the target user expects value from products and services and therefore the activities that create value involve a level of innovation.

At the organisational level Bowman and Ambrosini (2010) have proposed four types of value creating activities – activities that capture EV from customers, activities capturing UV from suppliers, capital stock creating activities and firm maintenance activities. Activities that capture EV are activities that generate revenue through provision of products and services. These activities can only be judged to be productive retrospectively as a sale needs to go through to realise the value. The activities that capture UV involve all activities organising the flow of inputs such as procurement and optimising of production efficiency. Capital creating activities aim to preserve and expand the human and organisational capital that exists by ensuring that the firm can respond to changes in the environment and can create new activities (e.g. research and development and training) and subsequently generate new streams of value. These activities create intermediate value (UV) which is for the use of the firm and in turn can be used to support new value-creating activities. For example, they may produce systems, which can be used to build VRIN (valuable, renewable, inimitable, and non-substitutable) resources. These are activities that incur cost and do not guarantee creation of EVs in the future and as such are liable to be targeted by cost cutting. Finally, firm maintenance activities include activities which are necessary for a firm to function but they do not contribute to value creation and profits. The authors include maintenance activities within value

creation as they are necessary for the creation but they effectively only incur costs.

Not all firm activities have a role in value creation. Some of them contribute to value destruction. Value destroying activities are not necessary, they do not capture either EVs or UVs, do not contribute to future profits, do not reduce costs and therefore they destroy shareholder value (Bowman & Ambrosini 2010). They represent weaknesses and liabilities, which can damage the competitive advantage of the firm. In the marketing literature on value, authors have proposed that within interactive value formation, there can be co-destruction as well as co-creation. Echeverri and Skalen (2011) in their study of interactive value formation using a public transport system demonstrate that when users are not aware of the proper procedures in using buses and their features, then they perform incorrect procedures leading to delays and holds of the buses. This is then perceived as annoying to the driver and poor service by the customers. The authors conclude that such co-destruction practices occur when there are disagreements and misunderstanding between participants in terms of what constitutes a correct practice. They conclude that while value can be both created and co-destroyed, co-destruction has received very little attention in the current literature and the issues and practices related to it have been neglected.

The management literature (Bowman and Ambrosini 2000, Lepak et al. 2007) distinguishes between value creation and value capture. Firms can create value which needs to be shared with other stakeholders who capture portions of the created value. When an entity at any level creates high use value but captures low exchange value, then it fails to capture the value they have created. Lepak et al. (2007) identify two mechanisms (competition and isolating) which determine how value is captured. The creation of a novel product or service will initially capture higher value as there will be lower supply than demand. However, as competition increases and other firms create a similar product or service, the supply will increase and the value will be shared between all firms. A similar situation can be presented at individual level if an employee innovates and creates a new task, product or service. Then in the short term they will not have competition and will be able to capture a higher salary. If there is high level of homogeneity of labour, then there will be increased competition between individual employees which reduces their remuneration and restricts what value the individual creators can capture. Isolating mechanisms create barriers to replication which can reduce competition and ensure that the majority of the value created is captured by the creator.

So far the discourse shows that value creation involves manipulation and deployment of bundles of resources. To utilise these resources so that value is created, human resources are needed as they are the only ones that can expand the value of the resource. The activities and processes that are applied to deploy the resources can be value creating or value destroying but there is no further contextualisation of these activities. One approach to conceptualise the link between the resource and the value created is through dynamic capabilities (Lepak et al. 2007). Dynamic capabilities are the abilities of the organization to create, integrate and release resources. Creation of new resources can occur through reconfiguration, leverage, learning and integration of existing resources. For example, the HR management literature contributes to this stream of value creation by examining the role of management practices to motivate employees and build up their skill in order for them to achieve organizational goals and thus create value (Lepak et al. 2007).

The dynamic capabilities perspective can be viewed as an extension of the resource-based view. It aims to explain how the stock of resources evolves and is renewed over time in a changing environment. The original definition by Teece et al (1997) is that dynamic capabilities refer to the organisation's ability to integrate, build and reconfigure internal and external competences to address rapidly changing environment. Since this publication, there have been a number of articles on dynamic capabilities and the authors have adapted and expanded on this definition (Ambrosini & Bowman 2009). The authors agree that dynamic capabilities are intentional organisational processes which are applied to change the existing resource base, they are built and cannot be bought and must be repeatable (Ambrosini and Bowman 2009). A dynamic capability is not a resource but a process that changes resources. The value of a dynamic capability is demonstrated through its output- a new more valuable resource.

As implied by the definition, there are different types of dynamic capabilities. Some dynamic capabilities integrate existing resources; others reconfigure them or build new resources. The existing literature provides some specific examples. Karim and Mitchel (2000) study the acquisition process as a dynamic capability which allows the organisations to reconfigure their existing resources. Zahra and George (2002) consider absorptive capacity as a dynamic capability which allows the organisation to create and use the knowledge necessary to build other organizational capabilities. Sharma and Shanks (2011) consider two types of dynamic capabilities – asset orchestration actions and search and select actions. Asset orchestration refers to “assembling and

orchestrating configurations” of assets to create new innovations. This is in line with the agreed definition. Search and select actions refer to managerial processes to identify actions to improve performance. These by themselves do not change the existing resource base and Ambrosini and Bowman (2009) argue against their definition as dynamic capabilities. This demonstrates that while there is a general agreement on the definition of dynamic capabilities, there is confusion and contradiction in its interpretation.

Dynamic capabilities are still conceptualized at an abstract level and need to be specified better so that researchers know what to look for (Danneels 2008). There is lack of empirical evidence in the field as most of the studies are conceptual or use quantitative studies describing broad organizational processes. These studies do not examine how capabilities are deployed or work (Ambrosini and Bowman 2009). To progress the conceptual development and understanding of dynamic capabilities, researchers have called for more qualitative studies in order to gather more rich data on the context and processes of creating and changing resources in organisations and the target users embedded in this context with their perceptions and needs (Lockett and Thompson 2001, Lepak et al. 2007, Ambrosini and Bowman 2009).

Some authors have suggested that dynamic capabilities are not specific to one organization but can be replicated. Eisenhardt and Martin (2000) argue that dynamic capabilities have common features and they create competitive advantage through the change in resources they affect rather than the presence of the capability itself. However, the development of capabilities does not guarantee organizational success (Zahra 2006). There is no general agreement on the relationship between dynamic capabilities and performance. Some authors argue that they are directly related but they do not offer evidence. Others state that the link is indirect through the creation and modification of VRIN resources including competences which then directly affect economic performance. (Bowman and Ambrosini 2003, Zott 2003). Finally, Helfat et al (2007) explain that the effect of dynamic capabilities may not be assumed to be positive. They may change the existing base of resources but this change might not lead to creation of new VRIN resources and the end impact on performance may even be negative. For example, if managers have misread the competitive environment, they may trigger inappropriate dynamic capabilities, which may harm organisational performance. Then the organisation will have to wear both the costs for deployment of the capabilities and their negative effect.

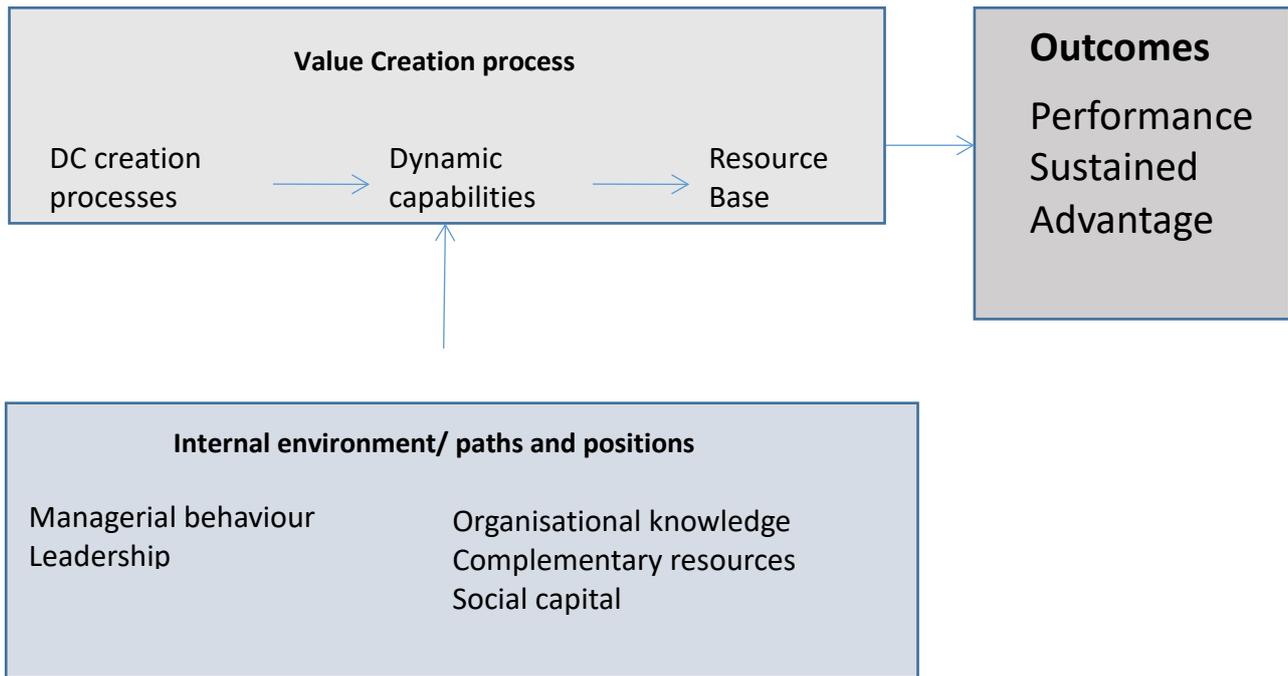


Figure 2.2 Dynamic Capabilities and Value Creation (adapted from Bowman and Ambrosini, 2009)

In conclusion, value creation is a complex subject as it is subjective, context-specific and can be analysed at multiple levels within multiple discipline domains. The value creation literature has established value outcomes such as exchange and use values. The sources of value can be represented by bundles of separable and human resources. Dynamic capabilities which enable organisations to create new combinations of resources can be contextualised as a capability (i.e. capacity for action) or as a process which deploys this capacity. Activities that are applied to the resources can be value creating or value destroying. All of these conceptualisations are quite abstract and do not provide a clear and rich picture of the processes which are applied at macro and micro level to produce the outcome. Researchers have called for richer and more contextualised studies to identify specific processes and mechanisms which build or reconfigure resources (Helfat 2007, Ambrosini & Bowman 2009). The following section reviews the current research in the context of IT-based initiatives.

2.3 Business Value of IS

This study will focus on technology supported knowledge management initiatives and therefore, it is relevant to review the literature on IT/IS value. Within the IS discipline this is a well-established research topic with a multitude of valuable and recognised publications including a number of

review papers (Deveraj and Kohli 2000, Melville et al. 2004, Kohli and Grover 2008, Schryen 2013, Sabherval and Jeyaraj 2015). The majority of studies focus on IS value at organisational level and examine the relationship between IT investments and value or performance at firm level. Many studies confirm that IT can contribute to improvements in organizational performance (Melville et al 2004, Kohli and Grover 2008). However, most of the empirical studies use data from the 1990s and a more recent study by Chae et al. (2014) did not find a significant relationship between IT capability and the firm business performance. These findings do not necessarily lead to the conclusion that IT does not contribute to value but rather raise questions about how and under what conditions IT creates value. To understand how we can build on existing research to address these questions, this section will synthesize the findings in terms of value concepts and measures, and value creating activities.

Most of the studies consider IT value at the organisational level, using economic tangible measures and organisational performance. Performance includes the internal perspective of efficiency and the external perspective of effectiveness in achieving objectives related to the external environment. Based on these two perspectives Melville et al. (2004) define IT value as the impact of organisational performance on both process and organisational level. The financial measures include return on investment (ROI), return on asset (ROA), cost ratios, profitability and consumer surplus (Barua et al 1995, Mithas et al 2012, Karahanna and Preston 2013, Chae et al. 2014). Representations of organisational performance also include market-oriented measures such as competitive advantage and market share (Benitez-Amado et al. 2010, Rai and Tang 2010, Nevo and Wade 2010). Some authors have conceptualised performance at the process level using a number of efficiency measures such as capacity utilization, inventory turnover, relative quality and productivity (Barua et al. 2004, Kohli and Grover 2008, Schryen 2013) but there is a lack of empirical research to show how these measures have been operationalised or what their relationship is with resources and outcomes. In these studies, process performance is proposed as a precursor to firm performance. Value outcomes are mostly not considered at individual level even in conceptual studies although the importance of focusing on multiple levels has been argued by review papers (Kohli&Grover 2008, Schryen 2013, Benbya 2011). Some studies have considered IT usage as a measure of individual performance which is a mediator in the relationship between the IT investment and firm value (Devaraj &Kohli 2003).

Kohli and Grover (2008) posit that IT value manifests itself in many different ways and it can be financial, intermediate or affective (perception-related). However, perception-related or intangible IT values have largely been neglected. These intangible values are conceptualised as intermediate values or internal capabilities which ultimately lead to economic impact. IT use at individual level, improved decision making or flexibility at organisational level are examples of these intermediate values. Researchers argue that they form an integral part of IT business value and neglecting them can lead to underestimating the economic value generated by IT investments (Devaraj & Kohli 2000, Schryen 2013). Nevo & Wade (2010) argue that the distinction between negative, positive and neutral emergent capabilities is a matter of perspective. For example, faster customer response through an automated system may be of positive value to customers who would like a quick resolution, negative to customers who prefer human interaction and neutral to the firm. This implies that the value is relational to the goal of the system. Despite this understanding of their importance, intangible affective values have been largely neglected. This gap is particularly relevant in the context of the public sector organisation where performance is not profit or market-oriented (Pang et al. 2014). The stakeholders of public organisations have very diverse interests and the values that need to be delivered can be very different. For example, a hospital aims to provide improved health and self-care but also efficiencies and these values are in conflict. Many of the IT value outcomes in public organisations identified in the literature are intangibles such as trust and confidence in the government, satisfaction and transparency (Pang et al. 2014).

Even this short list, above, demonstrates the confusion of terms such as features, benefits, and value and these terms are sometimes used interchangeably. A feature of a system may lead to a benefit which is an advantage which can be achieved if the feature is exploited well. However, value also incorporates the cost of achieving the benefit and the subsequent perception of worth when the benefits, costs and risks are balanced. There needs to be a consumer surplus between the utility and the exchange value. It is also relative to the consumer of the benefit and the context of value realisation. For example, it depends on the availability of alternatives which will deliver the same value. Schryen (2013) argues for the importance of including within the IT value concept perception-based values, which are subjectively interpreted by various stakeholders. However, relative perceived value has not been considered in IT value research.

A field of study closely related to IT business value focuses on the evaluation of IS projects and

benefits realisation. The majority of studies focus on pre-implementation evaluation which involves assessment of expected benefits, costs and risks to estimate the return on investment and other value to be delivered by the project. Benefits management refers to the processes associated with ensuring that IT use realises the potential benefits (Ward & Elvin 1999). Very few studies also have assessed realised benefits as well as facilitators and inhibitors affecting the actual benefits. For example, Coombs (2015) studied the use of an accounting information system in a city council and how it realised benefits and value at the organisational level. The study identified planned benefits such as relevant and reliable data, improved reporting and forecasting and reduction in paper use which ultimately aimed to improve performance against national indicators and to reduce costs. However, only the reliable and timely data and paper reduction were realised out of the list of planned benefits. The study demonstrated that there were factors which affected how the system was used and this influenced the benefits and value realisation.

IT value research has been dominated for many years by the Resource Based View as presented by the IT Business Value Model proposed by Melville et al. (2004)- fig 2.3.. The sources of value are IT resources and complementary organisational resources. Their application for improved or new business processes leads to improved business performance as an intermediary value outcome to which then contributes to organisational performance. In their review paper, Melville et al. (2004) include within organisational resources: policies and rules, organisational structure and culture, non-IT human and capital resources and workplace practices. The definition is very broad and inclusive comprising both separable and human resources but also practices and activities as capabilities and they are considered complementary when they are aligned (or in synergy) with the IT resources.

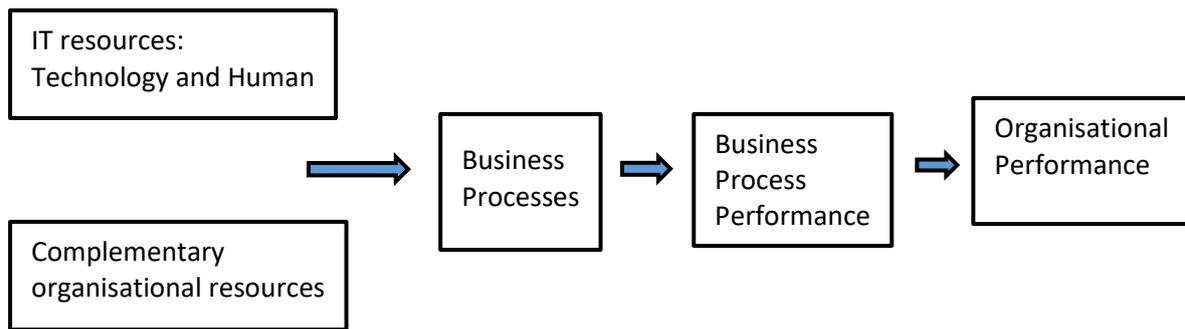


Figure 2.3. IT Business Value Model (Melville et al. 2004)

As discussed earlier, there are variations in how organisational performance is measured, but there has been consistent focus on economic performance. However, there is even greater confusion and proliferation in terms of how IT resources have been interpreted and conceptualised both in terms of level and types. The majority of empirical studies treat IT resources as one aggregate asset at organisational level but there is variation in what is included in it and not all studies specify what they consider to be the IT artefact (Orlikowski & Iakono 2001). Some authors consider that IT resources include all IT investments in the organisations while others divide the resources in 1) the capital stock such as IT infrastructure and technology services, specific applications and 2) IT human resources such as technical and managerial IT expertise (Bharadwaj et al. 2000, Melville et al 2004). In either of these cases, the aggregation of resources at the organisational level does not allow an examination of the relative importance of different resources. Some of them may maintain the functioning of the organisation, others may create value and competitive advantage and then some may actually destroy value. When they are grouped together, the overall value outcome will be diminished and the high level relationship between the investment and performance will not provide insights into the types of assets that have contributed most. Also, authors have argued that different types of IT investments may have impact on different aspects of performance and the aggregation of IT resources limits our understanding (Aral & Weil 2007).

More recent studies have examined the impact of individual types of assets ranging from infrastructure investments to types of systems such ERP systems, e-commerce applications and the results have been mixed in terms of impact (Schryen 2013). This may well confirm that different investments have varying impacts. However, the mixed results could equally be explained by contextual factors or synergies with complementary resources or how the IT and other resources have been deployed to create value. This brings us to the next question – how and why do IT resources create value?

The majority of studies on IT value are based on the resource-based view (RBV) of the firm and recognize that IT by itself and in isolation does not generate value (Nevo & Wade 2010, Kohli & Grover 2008). IT creates value only in certain conditions and when there are certain combinations of mediating factors. Kohli and Grover(2008) conclude that what we currently know about IT value is that IT and its complementary resources can create value on many levels and while we cannot prove the causality, we can extend our knowledge on mediating factors such as organisational capabilities, changes and alignment in the value creation process (Fig 2.4). Quaadgras et al. (2014) have found, based on evidence from case studies and a survey, that management commitments, including strategic choice making, action-oriented assessment, smarter work with information and development of digital platforms, positively influence the impact of IT on financial performance. In their study of data from 147 firms Aral and Weill (2007) found that the total IT investment is not positively related to organisational performance but investment in specific IT assets aligned with the firm's strategic purpose had a positive impact on performance. Furthermore, they found that IT capabilities including human resource capabilities, IT use measures, management commitment and involvement supported the positive impact of IT investments. There are still very few empirical studies investigating the role of mediating factors, the field is fragmented and all studies are at the organisational level (Schryen 2013).

One of the issues in assessment of IT value is that it is difficult to attribute the value generated by IT investments as they do not have impact in isolation. A stream of research focuses on the relationship between the IS assets and organisational capabilities raising the question as to how they co-create business value. In their conceptual paper on the formation and value of IT-enabled resources, Nevo and Wade (2010) introduce the concept of synergistic outcomes as positive emergent capabilities resulting from the relationship between IT and complementary organisational resources. They have called this synergistic outcome "*IT-enabled resource*", which is more valuable than the separate resource components. The article proposes that the increased rarity, value and inimitability of the combined resource positively impact the sustained competitive advantage of the firm. The authors also propose two conditions which enable the positive synergy – compatibility between the IT and organisational resources and management's effort to integrate the IT and organisational asset.

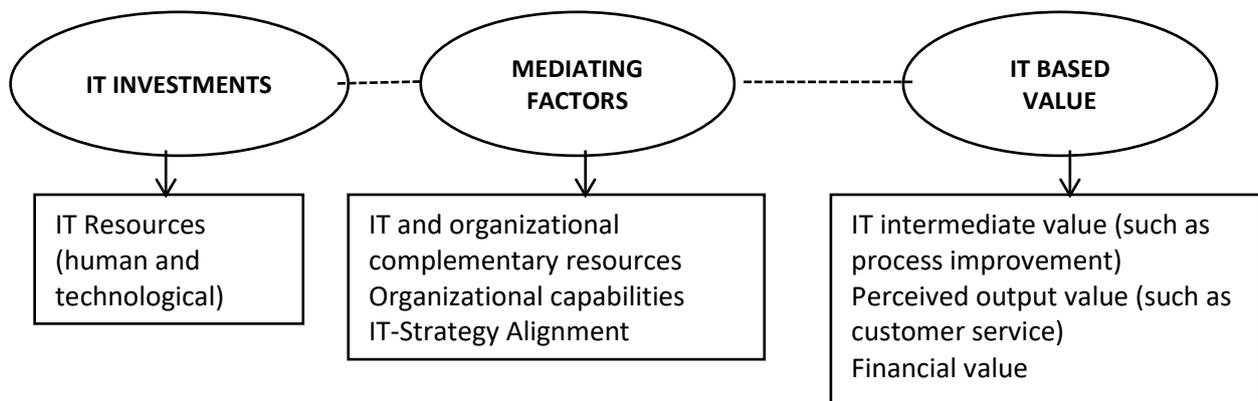


Figure 2.4 IT Business Value Creation (adapted from Kohli and Grover 2008)

The concept of synergistic outcome proposed by Nevo and Wade (2010) contributes to our understanding about the role of IT resources and the need to integrate them with other organisational resources to create a combined valuable resource. However, the study still does not address the processes and paths that lead from a valuable resource to competitive advantage or other value as it is still based on the RBV. Melville et al (2004) point out that a major limitation of the RBV is that it assumes the best use of resources and it does not study what such best practice might be. Thus, the path from the IT asset to performance remains a black box. Researchers have emphasized the lack of study of these paths that lead to economic value and how we enable them (Kohli and Grover 2008 Schryen 2013). Another assumption is that consequences of deploying resources are positive and add value but the original goals for the system are not always achieved and there can be unexpected and undesirable outcomes. For example, in a study of a UK hospital, Heeks(2006) reported that an attempt to introduce an expert system in a UK hospital failed as there were great gaps between the design conceptualisation and the domain reality. The system was too costly to operate, it was very hard to use and it required infrastructure which was not in place. As a result of these gaps it was eventually abandoned. Effectively it had destroyed the value to the stakeholders. Dwivedi et al. (2014) review a range of factors leading to IS failures reported in the literature and found that the reasons and consequences of failures are divergent. Once again, the authors conclude that “factor research” does not explain success and failures and they argue for the need to open the “black box” and examine successes and failures from

different perspectives. There is lack of theoretical and empirical research to explain divergent results and to show the pathways of value creation between the IT resource and the value outcome, and therefore the “how” and “why” questions remain unanswered (Schryen 2013, Daulatkar&Sangle 2015).

In conclusion, current research on IT business value has concentrated largely on studies examining the relationship between IT investments and economic outcomes at organisational level. The focus is output-oriented, measuring mostly financial post hoc metrics as representations of value. These metrics have not been able to capture, comprehensively, the true value experienced by businesses and customers. Researchers have called for a broader representation based on observations of practice of IT value from pure financial value to other “intangible “and perception-based value to all stakeholders. Furthermore, researchers argue the need to distinguish between internal and external value as information systems contribute to internal value through improved business processes, decision-making and flexibility. Ultimately, such value indicators still have an economic impact in the external marketplace. There is also consensus that value is a multi-level concept but current research has focused on the organisational level with very few studies considering value created at the business process level and no empirical work considering the individual level. The IT resource has also been mostly considered at the aggregate firm level which fails to improve our understanding of how specific types of IS assets can contribute to different types of value. This aggregation has also inhibited empirical research on complementarities and synergies between IT and other organisational resources and can account for the mixed results on value outcomes of IT investments. To address the question of “why” value is created by IT, some authors have identified mediating factors in the form of strategic IS alignment, organisational practices and capabilities. However, it is still not explained how these organisational capabilities and IT resources interact to create internal and competitive value. Although there is consensus in all review articles of the importance of understanding value creating activities and processes, they have not been studied or identified. Similarly, there have been numerous studies, reporting IS failures, which demonstrate value destruction but the causal explanatory paths to failure are missing. The IS literature also does not consider the concept of value capture. Given the fact that human resources consist of individuals and IT use is one of the few performance outcomes studied at individual level, value capture can identify factors

influencing the use and interaction with the IT artefact.

Based on the discussion in the last two sections, the review of the IS value literature identifies gaps in our knowledge of:

- 1) The value construct as consisting of affective and economic, internal and competitive dimensions;
- 2) The relationship between intermediate and final value outcomes;
- 3) Understanding how and why IS value is created and destroyed by specific disaggregated IS assets;
- 4) How value is created and captured at individual and organisational level.

2.4 Knowledge Management Systems and Value Creation

Knowledge management refers to activities and practices to leverage individual and collective knowledge to improve organisational performance and competitiveness (Gold et al. 2001, Heisig et al 2016). Authors have identified that KM processes include acquisition, creation, sharing and application of knowledge. Information systems and technologies facilitate these processes and form an integral part of most knowledge management initiatives (Alavi & Leidner 2001, Andreeva & Kianto 2012). Knowledge management systems is a term used for the class of IS used to manage organisational knowledge (Alavi & Leidner 2001). Knowledge management systems are different from typical information systems as they concentrate on knowledge which has unique characteristics that offer challenges in its transfer and use it. Therefore, while IS value research can inform studies on value from KMS and there are similarities in terms of desired value outcomes, the factors, sources and value creation processes can be different (Benbya 2011).

Knowledge-based capital has been identified as a main source of growth internationally and investment in it is highly encouraged for increased productivity (OECD 2013). A synthesis report on knowledge-based capital (KBC) provides a classification of KBC assets and their potential for output growth through invention, innovative methods, improved competencies and skills. A recent professional report on the service industry (HDI 2017) highlights the potential of knowledge management as respondents rank KM systems as the top “must-have”

technology for support centres, and KM as the third most important factor to improve customer satisfaction. A report on the importance of knowledge management based on data collected from the members of the Technology Services Industry Association (TSIA 2017) shows that 99% of respondents believe that improving knowledge management would boost team productivity. However, there are conflicting results from studies in terms of the contribution of KM to productivity and profitability (Heisig et al 2016). A survey of 222 KM experts across 26 countries (Heisig et al. 2016) found that experts believe that KM contributes to profitability and productivity due to the critical importance of knowledge as an asset but there is no evidence of its contribution. Based on the responses, the authors argue for the need to study the causal relationship between KM and business outcomes and to analyse both financial and non-financial business outcomes.

Knowledge management as a research domain is an interdisciplinary field, which has benefited from substantial contributions from scholars in human resource and strategic management, intellectual capital and information systems. The interdisciplinary nature of the studies has resulted in diversity and breadth of conceptual and empirical KM value models including a variety of value sources and outcomes. However, as this is still an emerging field, there is lack of consistency and convergence in the work. While this study focuses on technology based knowledge management initiatives, this section aims to overview the field from different perspectives in order to synthesise research on KM value creation. This includes a review of knowledge as a concept and as an asset, its value and components; KMS business value, value creation processes and factors.

2.4.1 The Concept of Knowledge

The theory of knowledge is a traditional branch of philosophy and focuses on defining the concept of knowledge (Moser et al 1998, p 1). The definition of knowledge from a philosophical perspective is still debated. The classical view of knowledge decomposes it into three conditions and forms a tripartite account of knowledge (Moser et al. 1998, Pritchard 2006). First, the truth condition requires that if a person knows something then that is true. This condition expresses the first element of knowledge - it has to be right. The second condition is the belief condition that states that if you know a proposition, then you believe it. This element of knowledge emphasizes that the knower has to believe that the knowledge

is right. It also emphasizes the fact that knowledge resides within people.

The first two elements of knowledge are widely accepted and agreed upon. However, it is obvious that the first two conditions are not sufficient to define knowledge. It is possible to believe a true proposition by luck. The third condition for knowledge is for the true belief to be justified; there have to be some good reason for the belief. However Gettier (1963) showed with some examples that it is possible for someone to have justified belief even if it is false, in other words someone can believe a proposition which in fact is false. This has led to a very rigorous debate on the validity of the tripartite account of knowledge (Moser et al. 1998 p 16, Neta & Pritchard 2009 p 7). Many researchers have sought a fourth condition to define knowledge better or have attempted to qualify the justification condition. This debate demonstrates that the concept of knowledge is complex and hard to define. However, there is an overall agreement that knowledge is different from facts or true beliefs and these results converge with the views in the KM literature that knowledge is different and more complex than data and information and includes facts, experience and judgement.

Based on the original work of the philosopher Michael Polanyi, Nonaka (1994) applied the tacit and explicit knowledge dimensions to business contexts. Explicit knowledge can be articulated and codified. Therefore explicit knowledge can be stored in external artefacts. Conversely, tacit knowledge is embedded in human beings and is contextual; it is normally associated with abilities and skills such as speaking a language or riding a bike. It incorporates both cognitive and technical elements. The cognitive element includes mental models and maps, beliefs and viewpoints. The technical element consists of know-how and skills that apply to a particular context. There is a disagreement in the literature whether tacit and explicit knowledge are two different types of knowledge as stated by Nonaka (1994) or are inseparable elements of knowledge (Alavi and Leidner 2001, Hislop 2009 p 36). This distinction is not trivial, it is linked to the objectivist vs social view of knowledge and it has implications for the knowledge management processes and strategies.

The objectivist view of knowledge regards it as an object or entity that people possess but it can exist independently and can be codified (Schultze and Stabel 2004). This explicit knowledge is free from individual subjectivity and therefore superior to tacit knowledge

which is very difficult to articulate and embedded within the individual context of beliefs and assumptions. (Jakubik 2007, Hislop 2009 p 19). Knowledge is perceived as commodity and can be incorporated in technology, products or other artefacts. Many KM studies based on the knowledge-based theory of the firm adopt this view on knowledge and make assumptions that knowledge can be quantified and objectively measured through quantitative methods. From an economics perspective knowledge as a good is stable in its content and can be bought and sold as long as there is a clear owner of the knowledge (Creviosier 2016).

Objectivists view tacit and explicit knowledge as distinctive and separate types and the sharing of these two types is completely different. Sharing of explicit knowledge is easy and its only requirement is a communication channel (Szulanski, 1996) (fig 2.5). Based on this assumption, the starting objective of knowledge management is to identify what tacit knowledge is important and convert it into explicit knowledge. Once all knowledge is in explicit form, the objective is to store it in a central repository which can be accessed by all. Typically technology plays a central role in such projects.

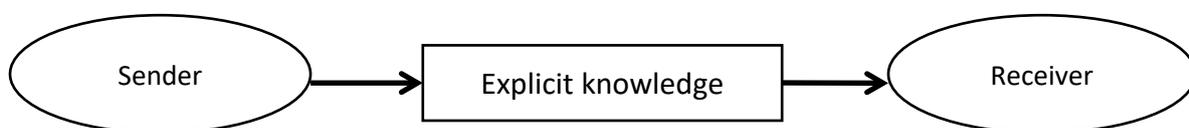


Figure 2.5 The Conduit Model of Knowledge Sharing

The social or community view of knowledge assumes that knowledge is a social construct which is not static but a collective activity (Jakubik 2007, Creviosier 2016). It is embedded within processes and day to day practices. It is based on the assumption that practices consist of both physical and cognitive elements and they are inseparable (Orlikowski 2002). Knowledge is created by combining internal and external knowledge through interactions, which are not normally market transactions, and participants are depended on each other (Creviosier 2016). This view considers knowledge as a process, not an object. It assumes that knowledge is constantly changing as people perform various activities. The view does not consider tacit and explicit knowledge as separate but as two sides of knowledge. Tacit knowledge is the necessary background that allows the interpretation and development of explicit knowledge. This link between tacit and explicit knowledge implies that only

individuals with sufficient common knowledge base can exchange knowledge, understand each other and correctly interpret the exchanged knowledge. This view limits the impact of IT on knowledge sharing (Alavi and Leidner 2001). Finally, the social view accepts that knowledge can be disputed as it is not objective and true. Based on these main assumptions the social view concludes that knowledge sharing requires a mutual understanding of tacit assumptions, immersion in practice and social interaction. It places strong emphasis on management and leadership practices to support social interaction and trust.

There is very little research on where and why the value of knowledge is. One response to the value problem is the virtue theory (Greco 2009, Zagzebski 2003). This theory recognizes knowledge as a type of cognitive achievement. The virtue theory defines knowledge as true belief that has been formed by some reliable cognitive traits of the agent. It is based on the assumption that people value more successes that they have achieved based on their own ability and effort rather than luck for example. This implies that individuals capture the value of acquired knowledge.

Kvanvig (2003) in his seminal book, 'On the Value of Knowledge', concludes that although knowledge has value, it is not distinctly valuable. He proposes the concept of understanding that may have a distinctive value (Kvanvig, 2003, p188). He uses two meanings of understanding. Understanding can be viewed as a deep and comprehensive knowledge of a subject or an issue or it can mean understanding that something is the case. These two uses exclude understanding of how as "it is more relevant to practical than to theoretical purposes". Unlike knowledge, understanding requires an internal grasp of the relationships between items of information. While knowledge can be disconnected, understanding requires more completeness. If a person does not understand individual items that are part of related collected items, then they are not likely to understand the whole collection.

From economics perspective, a distinct characteristic of knowledge is that it can be a public or nonrivalrous good (Grant 1996). When a person shares or sells knowledge they can still own the it. Economic value can be generated when there is clear ownership and authorship (Crevoisier 2016). When the knowledge can be objectified and separated from the author, then its economic value is dependent on the ability of the firm to control it and to maintain exclusivity. This is why explicit knowledge is valuable when it can be protected by copyright

or patents and some studies use citations or patents as measures of knowledge value (Fallatah 2018). Significant (tacit) knowledge creates economic value when it is shared and diffused (Crevoisier 2016). It can only be appropriated and generate value when it is applied to a value-productive activity, the value is a utilisation value (Grant 1996). The author of the knowledge who has shared it, can only capture value only when they receive acknowledgement.

Finally, the intellectual capital literature recognises three types of knowledge-based capital-human, structural and social capital.

Human capital represents the value of the skills, tacit knowledge and capabilities of the individuals associated with an organization. Individuals in organizations possess general or public knowledge (generic human capital), occupation-specific human capital and industry-specific capital. Occupation-specific and industry-specific knowledge relate to established knowledge domains in professions, sometimes they are obtained through certification with a professional body and hold more value to the individuals and the organizations. Finally, employees as a result of their work experience in an organization gain firm-specific knowledge such as unique processes, documentation or trade secrets. Such knowledge is only applicable and valuable to a particular organization. Therefore, the acquisition of firm-specific knowledge increases the value of human capital to the organization and reduces the employee mobility. However, research shows the issues of sharing knowledge increase with increased proportions of firm-specific knowledge (Lepak&Snell 2003). As employees gain more of what is uniquely valuable to the organization, they are more reluctant to share it as they perceive this capital as a valued asset. From organizational perspective, knowledge increases and its value increases with the number of users and moving it to the organizational level. Organizations face a key issue of selecting KM practices which enable and encourage sharing.

Structural capital is a component of intellectual capital and refers to the value of the processes and packages that allow human capital to be used effectively to create value (Smith & McKeen, 2003, p356). It relates to the knowledge that has been captured/institutionalised within the structure, processes and culture of the organization (Petrash, 1996). Structural capital has embedded in it socially validated and useful knowledge and it can be classed as a

knowledge asset (Boisot, 1998, p117; Bowman & Swart, 2007)

Customer capital is another component of intellectual capital and represents the value of the relationships of an organization with the people with whom they do business (Smith & McKeen, 2003 p356, Ravaud & Gronroos, 1996, p23, Petrash, 1996)

Social capital is based on the assumption that social relationships have value. It is a know-who, an informal organization, a social structure that exists in parallel to the formal hierarchy of an organization (Smedlund, 2008). Social capital is both a resource and a value driver. Relationships between employees and contacts from outside the organization are considered a resource. Internal network structures based on trust and common beliefs and norms allow organizations to acquire, integrate and release resources, which is one of the most important value drivers (Smedlund, 2008).

Social capital is the sum of the actual and potential resources available that derive from the relationships possessed by an individual or in a social unit (Nahapiet & Ghoshal, 1998). The structural, cognitive and relational dimensions of social capital influence the combination and exchange of intellectual capital, which then directly affects the creation of new intellectual capital. There are different perceptions of the components of social capital but they all fall in three categories- networks, norms and beliefs. This study will adopt the framework of Nahapiet & Ghoshal (1998) as it is comprehensive and generally accepted in the SC literature. The structural dimension corresponds to networks and provides the context that forms norms and beliefs.

McElroy et al (2006) in their synthesis of the social capital literature argue that all major forms of social capital are effectively different forms of knowledge. Therefore, knowledge management plays an important role in development of social capital. They propose that knowledge management should care and feed the social capacity of groups and organizations to learn and solve problems.

Human capital and social capital are parallel and complementary and they reflect different aspects of a socially constructed wealth creating activities and resources. Similarly, IC is parallel to HC as it focuses on group activity in contrast to the HC perspective, which focuses

on individual level activity. Social capital provides the social relations and structures necessary to create and enhance HC and IC ((Manning, 2010)

In conclusion, knowledge is multifaceted and complex but all forms have potential value. These forms should not be separated but they may have different degree of value. All research streams agree that knowledge resides in people but it is created within a firm and is firm-specific. The role of people is not only as the source of knowledge but also as knowledge creators. There is an overall agreement that knowledge is transferred/enhanced by interactions and that the value of knowledge is linked to actions.

2.4.2 KM Strategies and Processes

Different perspectives of knowledge define different approaches to knowledge management. When knowledge is viewed as an object the focus of KM initiatives is on building knowledge stocks and providing access to them. When knowledge is viewed as a process, the focus of KM is on knowledge flows and supporting the creation and sharing of knowledge. Finally, when knowledge is considered as a capability, KM initiatives aim to build competences, gain strategic advantage from know-how and create intellectual capital (Alavi and Leidner, 2001).

KM strategies can be divided into two main categories – personalization and codification strategies (Hansen et al 1999). Personalization and codification strategies place different emphasis on the importance of tacit and explicit knowledge. However, they are not mutually exclusive and both strategies are beneficial.

Organisations using the codification strategy concentrate primarily on transfer and reuse of explicit knowledge. The objective is to capture and codify knowledge for broader access within the organization. Such initiatives focus on the design and use of searchable repositories of explicit knowledge using technologies such as intranets, groupware and document management systems. Knowledge repositories typically contain best practices, lessons learned from past experiences, knowledge about products, services and customers. Some companies include within their knowledge management activities projects and systems that aim to transform data into usable information through data mining and statistical analysis.

Personalization strategies assume that a lot of important knowledge is tacit and the main

mode of knowledge transfer is through personal interaction. KM initiatives focus on improving social processes to facilitate knowledge sharing between individuals. Some of these initiatives rely on the support of IT to bring people together. For example, organizations work on creation of corporate directories of internal expertise to connect people to the right experts within the organization; creation of knowledge networks which allow people to communicate virtually or face to face. Other initiatives may not use technology at all and concentrate on the creation of organizational culture which motivates people to share their knowledge and on providing regular social interactions between employees.

Following the two main strategies, Inkinen (2016) reviews empirical research on KM initiatives and their impact on organisational performance. He suggests a categorisation of human-oriented KM practices, technology-oriented KM practices and organisation-oriented KM practices. Human oriented practices include HR management and leadership practices such as building incentive and control systems and leadership to motivate employees' participation and to improve the performance of KM processes. Technology-oriented KM practices view IT as a resource that supports KM processes such as acquisition, transfer and creation. However, the author emphasises that the majority of technology-oriented studies also consider the IT as complemented by HRM practices. Finally, organisation-oriented initiatives include initiatives focused on setting up structures including KM tools and formulating strategic plans and directions. Although the authors confirm the validity of the categorisation in terms of practical perspectives, it is clear from reviewing the articles that there are overlaps and complementarities between the three practices. Cohen & Olsen (2015) confirm this view as they have tested the effect of IT and HR knowledge management capabilities on performance measures and have concluded that the stronger impact is achieved when the complementarity perspective is applied where the two capabilities mutually reinforce their action and impact. .

The main processes or activities that are applied to knowledge within organisations fall into four main categories – generation, codification, sharing and application (Grover and Davenport 2001). Knowledge generation refers to the development of new content or modification of existing knowledge. Knowledge codification refers to activities that convert knowledge into explicit knowledge. Codification of knowledge makes it more accessible and

easily shared among many people. However, as discussed earlier, not all knowledge can be transferred into explicit form and is dependent on the context. Therefore, codified knowledge may be incomplete or it might be difficult to apply to other contexts and projects. Employees may not be aware of relevant tacit knowledge they possess or they may not be willing to assist in codifying their experiences. Knowledge transfer or sharing includes the flows of knowledge from its point of generation to its point of use. Knowledge sharing can be supported by information technology that connects people to knowledge and people to people. Impersonal channels are more successful when the knowledge can be articulated and can be generalized to many contexts. Other activities supporting sharing involve the creation of opportunities for social interactions that allow employees to share knowledge regularly. Knowledge sharing is an important process that allows individual knowledge to move to organizational level. It is dependent on the willingness of individuals to share their knowledge and their willingness to accept knowledge. Finally, knowledge application is the process of using existing knowledge to perform a task. Grover and Davenport (2001) have called this process knowledge realization to emphasize this is the process that creates value for the recipient and the firm. Other authors agree with this view that the value of knowledge is only realised through practice and not by transfer alone (Alavi and Leidner 2001, Spender 2006).

It is important to note that these knowledge activities are not discrete consecutive steps of a process. They are dynamic processes and practices that can occur in parallel and are embedded in individuals and groups and physical structures. Knowledge processes aim to leverage the knowledge resources in order to build organisational capabilities and contribute to value creation (Schiuma & Carlucci 2012). Many KM initiatives have focused on improving the flows between individuals and groups to support transfer and application of knowledge. Knowledge processes can result from deliberate KM initiatives or be part of work practices.

2.4.3 Business Value of KMS

KM value is an emerging field and all reviewed articles have been published in the last 15-20 years with very few empirical studies including technology-based KM initiatives and reviewers suggesting that most of the work on value has been done in IT value literature (Benbya 2011, Andreeva & Kianto 2012). In parallel with IT value studies, most of the articles in the KM literature consider KM value at organisational level and link it to a performance measure.

However, the starting points in this area is that knowledge and its management are the valuable resource that improve performance and creates value for organisations (Schiuma &Carlucci 2012). There is a wide range of conceptualisations and interpretations of the knowledge asset including infrastructure, organisational and knowledge capabilities. Inputs were categorised as infrastructure/enablers and knowledge process capabilities while the value outcomes were differentiated as intermediate and organisational performance outcomes (Fig. 2.6.) There is a greater representation of performance measures including intangible and intermediate outcomes such as customer service, innovativeness, creative learning, intellectual capital outcomes as well as financial measures. This diversity and fragmentation of the field has produced mixed and conflicting results. This section synthesises the findings of studies which include IT as a component of KM practices and initiatives. It is structured in terms of inputs (resources and capabilities) and value outcomes

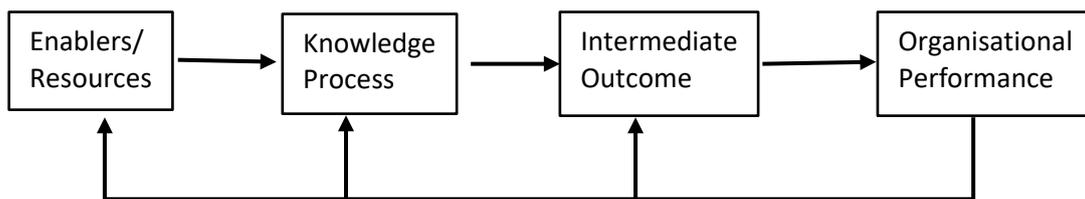


Figure 2.6. Integrative KM Value Framework (adapted from Lee & Choi 2003)

There is evidence that knowledge management affects performance and creates value for organisations. Researchers have applied various theoretical perspectives when they have assessed what is the impact of knowledge management. Studies are largely based on RBV (Carlucci et al. 2004, Lee &Choi 2003, Holsapple & Wu 2011, Lee et al 2012) the knowledge-based view (Donate & Guadamillas 2011), and contingency theory (Sabherwal &Sabherwal 2005, Zack et al. 2009). The Knowledge-based view of the firm is an extension of the RBV and it is similarly based on the assumption that a firm’s competitiveness is dependent on internal resources and capabilities but it focuses specifically on knowledge based resources and capabilities for development and utilisation of knowledge. The majority of studies are based on the KBV and focus on the impact of knowledge management on firm performance. There has been a very wide interpretation of the knowledge management as a source of value. Studies focus on: HR initiatives aiming to develop culture and leadership

(Donate&Guadamillas 2011, Mousavizadeh et al. 2015); the impact of knowledge as an asset (Tan & Wong 2015, Wang et al. 2016); how KM performance affects financial performance (Holsapple & Wu 2011), the relationship between knowledge management processes/practices and performance (Zack et al. 2009, Andreeva & Kianto 2012, Abusweilem & Abualoush 2019) and finally, the relationship between resources (including IT) and performance (Lee& Choi 2003, Lee et al. 2012). While it can be argued that knowledge management processes are normally supported by information systems and the results would be relevant to draw conclusions on the role of KMS, this review will concentrate on studies where IT is explicitly included as a component of KM initiatives or their facilitator.

The Knowledge Management literature has interpreted value largely as organisational performance measured by economic measures, self-reported perceptual performance and self-reported intangible measures. The majority of measures are externally oriented measures associated with the competitiveness of the firm. Some studies use perception-based measures of organisational performance including the perceived degree of overall success, market share, growth rate, and innovativeness relative to other competitors (Lee & Choi 2003, Andreeva & Kianto 2012). Lee et al. (2012) define organisational performance as the capability to develop new products and services, to predict business or risks, to cope with new information of markets. Very few authors have adopted objective economic and performance measures. For example, Sabherwal & Sabherwal (2005) use the firm's stock market value measured by the cumulative abnormal return (CAR) associated with announcements of IT based KM efforts. Cohen & Olsen (2015) measured financial and market performance in the hospitality industry as growth, occupancy rate, profitability and revenue per room. Martelo-Landroguez & Cepeda-Carrion (2016) collected financial performance data on market share, sales volume, profit labels and margins , and ROI from annual accounts of Spanish banks. Other studies include both external and internal measures of value within one performance construct. Chuang et al. (2013) include in their performance construct perceived external performance measures (improvements in market share, growth and profitability) and operational performance represented by reduction in costs. Abusweilem & Abualoush (2019) also included both external and operational performance measures in their model but their conceptualisation of operational performance includes non-financial measures such as customer and employee satisfaction, product quality, service quality, strategic goal

accomplishment and workforce development. Tan & Wong (2015) only consider manufacturing operational performance as the value outcome in their KM value model. Finally, Fischer et al. propose a measure for ROI from KM including both process capabilities and outcomes - the time saved per employee, increased networking, improved quality and applying KM to address business needs.

The majority of studies theorise that the impact of KM practices and initiatives on organisational performance is indirect through positively influencing an intermediate outcome. The intermediate outcomes suggested by authors can be categorised as organisational capabilities, intangible value outcomes and internal operational values. Lee & Choi (2003) posit that organisational performance follows outputs of creativity and in their model they test the relationship between organisational creativity as an intermediate outcome and organisational performance. In their definition, organisational creativity is measured by both outputs (novel ideas, products and services) and the conditions that the organisation provides for creativity (the environment, time to spend on creative work). Lee et al. (2012) specify an intermediate outcome resulting from a KMS as creative organisational learning measured by the improved ability to review and challenge existing business practices. Innovativeness is another organisational capability used as an outcome of KM practices measured as innovation and rate of new product development (Wang et al. 2016, Zack 2009). Wang et al. (2016) also include the elements of intellectual capital (human, structural and relational capital) as intermediate outcomes of knowledge sharing which then in turn influence operational and firm performance. This confirms the conceptual work on the value of knowledge which suggests that knowledge as an asset grows through knowledge sharing and it is both an input and output of KM. Finally, some studies introduce customer values as an intermediate outcome and their measures included customer satisfaction, loyalty, customer retention (Zack et al. 2009, Cohen & Olsen 2015, Martello-Landroguez & Cepeda-Carrion 2016).

Knowledge Management Systems (KMS) and related technology infrastructure are widely recognised as an integral component of knowledge management initiatives and authors argue that KMS contribute to achieving and sustaining competitive advantage (Andreeva & Kianto 2012). Current reviews of the literature show that there is lack of empirical research on the

value and impact of KMS (Benbya 2011, Andreeva & Kianto 2012, Inkinen 2016) There are a few studies which examine the impact of IT-based KM on organisational performance and most of them report positive relationships between KMS and performance. In addition, there is an indication that it increases shareholders' value as one study demonstrates stock shares increase in response to IT-based KM announcements, which implies that investors perceive value and benefits from such initiatives (Sabherwal & Sabherwal 2005). However, results are mixed with evidence demonstrating direct positive relationship with performance (Sabherwal & Sabherwal 2005, Chuang et al 2013, Tan & Wong 2015), significant negative relationship with economic performance (Andreeva & Kianto 2012), indirect effect through an intermediate outcome (Tanriverdi 2005, Lee et al. 2012, Cohen & Olsen 2015) or no significant relationship with performance (Lee & Choi 2003). These discrepancies can be explained by the wide range of conceptualisations of KMS/ KMIT and the theorised links between KMS and various components of the tested models.

The review of value measures above shows the confusion and ambiguity of the conceptualisation of the KMS value construct and this is an output issue. However, there is also a serious input issue in terms of the conceptualisation of KMS or KMIT as it is fractured and still under development. Authors' interpretation varies from infrastructure to IT support as a service, and IT capability to support knowledge management processes. Many of the definitions are ambiguous and broad; therefore they can be interpreted by respondents in multiple ways. For example, the most common conceptualisation of KMS used in the few existing empirical studies is IT support for knowledge management processes. This can be interpreted as a variety of systems or infrastructure components. For example, IT support for knowledge sharing may include the availability of collaborative communication tools, structured knowledge repositories, expert networks and directories or process workflows with embedded knowledge. Each of these applications may have different impact on intermediate and external value outcomes. Therefore, this aggregation resources leads to lack of understanding of the relative importance of different types of KMS and KMIT and how they affect different value outcomes.

The most common factor used is IT support but the measures used in studies are very different. Lee & Choi (2003) define IT support as the degree to which IT use supports

knowledge management. IT support was measured by the provision of IT for collaboration, communication, searching, simulation and storage. These items do not necessarily relate to use for knowledge management, as most organisations would have information systems providing communication, search, simulation, and storage without necessarily supporting knowledge management. Their study found that IT support only had an impact on the combination part of knowledge creation and no significant impact on performance. A later study by Lee et al. (2012) presents a similar model with IT support as a resource affecting performance through knowledge processes capability and it states that the instrument used for IT support is based on Lee & Choi (2003). They found that IT support has a significant positive relationship with effect on performance mediated by knowledge process capability.

One explanation for the conflicting result may be the fact that the authors have included all knowledge processes and not only knowledge creation. However, examination of the measures shows that the way that IT support is measured is also quite different. The authors have reworded all items significantly to represent KM processes and outcomes such as access to knowledge any time and any place, environment to support exchange of opinions, access to knowledge and information, tools for decision-making. Andreeva & Kianto propose a similar construct ICT practices for KM which includes the availability, updating, monitoring and acceptance of KMS, knowledge sharing and decision making capability. Chuang et al. (2013) have used a concept similar to IT resource, called overall KM IT, which they define, as the extent to which the IT supports creation, transfer, integration and leverage of internal knowledge. They also include five additional formative dimensions representing support of knowledge management for primary processes – outbound, inbound, marketing and sales, service, and operations. These dimensions measure the degree to which IT supports the creation, sharing, integration and leverage of the specific domain knowledge (e.g. logistics). Cohen & Olsen include IT systems as one of the components of the codification capability. They define IT systems as IT support for knowledge management and measure it by the availability of systems for knowledge sharing, embedded knowledge in databases, problem solving systems and knowledge protection. Effectively, with this conceptualisation, the authors include all technology-based KM solutions as part of the codification capability even though they have explicitly included sharing and application in the measurements as well. In their model there is a separate knowledge sharing factor but that is part of the human capital

capability.

The studies discussed above define the IT resource relative to its support for KM processes. Other studies adopt broader definitions, which are not connected to KM processes. Tan & Wong (2015) include infrastructure and technology and they measure it by investment in IT, user friendliness of IS, and availability of technologies to facilitate KM. Tanriverdi (2005) argues that the link between IT and performance is not well understood and propose that the link is mediated by KM capability. The author represents the role of IT by IT relatedness in multi-unit businesses and defines it as standardised infrastructure, common IT strategy, alignment of HR and vendor management processes. Zaim et al. (2019) do not propose a separate IT component but include technology-based items in their measurement of knowledge sharing and knowledge capture processes and examine their relationship to knowledge utilisation and KM performance.

In conclusion, the KM value literature, which has largely focused on the impact of KMS and other IT-based KM resources on organisational performance. There is evidence that KMS contribute to both internal and external performance but the results are limited to the organisational level and the field is still emerging and fragmented. There is a wide range of conceptualisations of value and inputs and the IT resource is aggregated to include multiple forms including systems, infrastructure and service. As argued by the IS literature discussed earlier, the effects of these various components will vary and there is need to examine their role separately. .

2.4.4 KM Value Creation

There is very little conceptual or empirical work attempting to address the question of how or why KMS create value but streams of research have emerged in the last 10 years. Recognising that there are synergies between IT resources and other capabilities, one stream has examined the mediating role of organisational capabilities. Another recent direction is to investigate the complementary relationships between IT resources/capabilities and other organisational capabilities.

To investigate potential complementarities, Cohen & Olsen (2015) propose two capabilities

as the inputs to value creation- codification capability and human capital capability. The codification capability includes codifying practices and IT systems while the human capital capability includes knowledge sharing and HR development. The authors tested the model from a complementarity, contingency and universality perspectives and concluded that the complementarity perspective, where codification and human capital were integrated, produced the best results for performance. Andreeva & Kianto (2012) also considered the effect of ICT and HRM knowledge management practices independently and when they are coupled together. The results showed that both ICT and HRM practices have statistically significant influence on competitiveness and economic performance. However, ICT practices had a negative influence on economic performance independently and positively contributed to performance only when mediated by HRM practices. This suggests that there are complementarities between IT-based and HR-based practices but the study was limited as it only considered rewards as HRM knowledge management practice.

Another approach to investigate how KMIT contributes to improved performance has been to propose an indirect effect through contribution to an organisational capability which has direct effect on performance. Lee et al. (2012) specify an intermediate outcome resulting from a KMS as creative organisational learning measured by the improved ability to review and challenge existing business practices. Innovativeness is another organisational capability used as an outcome of KM practices measured as innovation and rate of new product development (Wang et al. 2016, Zack 2009). Lee & Choi (2003) include in their enablers separable inputs (organisational structure and information technology), human input (T-shaped skills of employees, IT support) and organisational capabilities (collaboration, learning and trust). However, they tested the relationship of these enablers only with knowledge creation process capability and found that employees' skills and IT do not positively influence knowledge creation. Building on their model, Lee et al. (2012) conceptualised knowledge management infrastructure as composed of four groups of enablers – culture, structure, management and technology. In their study, four processes were aggregated in the knowledge processes capability construct – acquisition, conversion, application and protection. The results confirmed significant positive effect of IT support, learning culture and top management support. However, the hypotheses related to trust and decentralised structure were not supported in this study.

A few studies have considered the relationship between KMIT and performance in conjunction with other organisational factors. For example, Chuang et al (2013) included organisational structure, culture and incentives as enablers of KM IT support and the results demonstrated that they were all strongly and positively related to KMIT. Cohen & Olsen (2015) found that there was support for the contingency perspective demonstrating that the relationship between KM capabilities and performance is moderated by business strategy. This suggests that the same initiative can contribute or not to performance depending on how well it supports the business strategy. Tan & Wong (2015) propose a comprehensive model, which first proposes three factors – knowledge resources (human and intellectual capital), KM processes and KM factors (culture, leadership and strategy, infrastructure and technology). The results demonstrated that all three factors had a positive relationship with manufacturing performance independently but they were also strongly correlated with each other and the authors suggested that they can be grouped in one KM construct. Following this logic, a few studies consider only knowledge management process capabilities as the source of value. For example, Abusweilem & Abualosh (2019) test the relationship between knowledge management and organisational performance. They have included knowledge creation, knowledge sharing and knowledge utilisation as components of knowledge management.

In conclusion, researchers have recognised the importance of the relationship between KMIT and organisational capabilities. Current research has investigated this relationship through associations between KMIT and enablers and the mediating role of organisational capabilities. However, the research on complementarities between capabilities is still emergent and fragmented with varying conceptualisations and mixed results. It is still unclear how and why KMIT assets and complementary capabilities create value. In a seminal paper proposing a knowledge-based theory of the firm Grant (1996) argues that to create value from knowledge, the main goal for the firm is knowledge application. The theory is based on the assumptions that knowledge resides in people, organisations gain from specialisation and that producing goods and services requires a range of specialised knowledge as input. Given these assumptions, the goal of the organisation is then to integrate the knowledge of many individuals and coordinate their activities. Therefore, Grant (1996) proposes coordination as a mechanism for integrating knowledge. The author also draws on research from institutional

economics to identify potential issues of lack of cooperation, as individuals would have divergent and potentially conflicting goals. However, this conceptual work has not been developed further and there is no work on the mechanisms and practices that create value. The complex dynamics through which knowledge-based IT resources and knowledge processes create value for organisations are still not well understood and the research field addressing this question is wide open (Schiuma &Carlucci 2012).

2.5 Summary

Drawing on current research on value creation from economics, management and IT perspectives, this chapter has synthesised the main findings aiming to identify gaps and motivate this study to address the gaps. Despite the different perspectives and a wide range of conceptualisations, there were some consistent themes in all domains researching value creation: disproportionate focus on organisational performance has led to limited understanding of the multifaceted value construct; predominant aggregation of the IT resource has led to mixed results and limited understanding of the importance of different types of IS; value creation and value outcomes at individual level have been neglected; how and why IT-based resources interact with other capabilities forms a black box. This section briefly summarises each of these themes.

Resources have use values, which are relational and relational as perceived by individuals and stakeholders. This use value can then be converted to a non-relational exchange value represented by the objective monetary amount that an external party is willing to pay. Value is a multi-level concept and it can be examined at individual, group, process, organisational and macro level. The literature on IS and KMS value has been dominated by studies representing value as financial organisational performance despite the recognition of the importance of perception-based value. Therefore, the review has identified the need to improve understanding and theorising of a comprehensive value concept, which incorporates intangible, intermediate, affective and individual-level indicators and the links between these different types of value.

The IT asset or resource in the IS and KM literature has largely been aggregated at the organisational level. Definitions and measurements vary to include a wide range of IT assets

such as physical infrastructure, information systems, IT support as a function or IT support for specific knowledge management processes. The variations in conceptualisation have led to confusion and mixed results creating barriers to building on existing studies and progressing research in the field. Treating the IT resource as an aggregate artefact limits our understanding of the relative importance and impact of different types of IT assets, it can reduce the overall impact or in some cases has led to results implying negative or no impact on performance. One type of asset may be needed to maintain internal value and be treated as expenditure while another type may support strategic directions and improve the organisational competitiveness. There are strong arguments in the literature for examinations of specific forms of IS to isolate their role and to allow researchers to study complementarities and synergies with other organisational resources.

Review of the strategic management literature shows that value creation includes activities at all levels that lead to improvements in value for the target users. These activities capture use and exchange value, maintain the functioning of the organisation or create capital stock. Capturing value is also very important for organisations and individuals since creating value without capturing a large portion of it does not improve competitiveness. Activities which do not capture UVs or EVs, do not improve profits or reduce costs are considered to destroy value. Research postulates that value creating activities involve deployment of separable inputs by the human inputs, interaction between infrastructure and human resources. This proposition is supported in the context of the IT and KMS value literature as there is evidence that complementarities and synergies between IT and organisational capabilities are required for IT to have impact on financial performance. In the context of KMS, there is evidence of a mediating effect of human resource development practices. However, the vast majority of research has focused on measuring impacts through associations between inputs and outputs and in some cases the associations with organisational capabilities. These associations do not confirm causal links and do not explain how IS/KMS interact with other capabilities and resources and how and why they jointly create internal and external value , what are the causal paths that explain value creation. Current research recognises this lack of explanation of interdependences and causal links between IS and value as a significant gap in knowledge and “a black box” which needs to be opened up.

In conclusion, the question of how and why information systems and other IT resources create value is still unanswered. There is need for contextual studies to contribute to and build explanatory theories of value creation. Future research needs to consider specific types of information systems, creation and capture of internal and external value at micro and macro level, causal paths to planned and unanticipated value outcomes.

Chapter 3 Research Design and Methodology

3.1. Causality

The main focus of this study is to understand and explain how KMS create or destroy value in organisations, what are the reasons or causality of value outcomes. Causality has rarely been discussed explicitly in the IS literature (Mingers & Standing 2017). Causative assumptions vary across the positivist, constructivist and critical paradigms. The positivist view of causation is that it represents constant conjunction of events. Constructionists emphasise that theories are dependent on perception, judgement and interpretations. The critical realists view causality as generative occurring through interactions of mechanisms which have causal powers (Mingers 2002). Durand and Vaara (2009) propose four conditions necessary for understanding of causality: causation is differentiated from constant conjunctions or associations; causation results from a complex interplay of mechanisms; actors' constructions and social interventions are important; and explanations have instrumental value depending on their explanatory power.

In the context of IS, Markus and Robey (1988) propose three dimensions of the causal structure of theories: causal agency, logical structure and level of analysis. The causal agency can be driven by technology, human actors or both. The logical structure includes variance and process theories, The level of analysis can be micro (individual), macro (society or organisations) or both.

As demonstrated by the literature review, the research on IT and KMS value is dominated by the positivist perspective. The assumptions about causation within the positivist view are that the world is governed by universal laws, repeated observations can be used to hypothesize a law, based on this hypothesis predictions are made and observed to confirm or reject the hypothesis. The philosophical underpinning of the positivist causation is Hume's representation of causation as a constant association of events (Mingers 2017). Hume argued that only observable events are real, causation is defined as events consistently following each other and there is no underlying explanation of the conjunction of events as it is unobservable. He considered explanations as a psychological custom rather than reasoning and that observations can only confirm that one event is constantly followed by another but

they cannot reveal “ the secret connexion, which binds them together” (Hume 1978). This view of causality as regular joint occurrences of observable and measurable events has been widely adopted by studies using statistical analysis. However, the issue with this view is that it accepts that research cannot address questions about why events occur or uncover the underlying reasons for the event conjunctions (Bhaskar 1978). To address this limitation, this study will adopt a critical realist approach, which incorporates the conditions proposed by Durand and Vaara (2009) outlined earlier.

3.2. Critical Realism

The paradigm guiding this research is critical realism. The ontology of critical realism assumes 1)a reality independent of human knowledge, 2)a stratified ontology which consists of structures, mechanisms, events, and experiences ; 3)emergent powers dependent on the lower level powers and 4) open systems perspective.

3.2.1 Principles of Critical Realism

The critical realist view of causation is that events occur because of interaction of generative mechanisms, which have causal powers. The mechanisms can be physical, social, psychological or conceptual, and may or may not be observable (Bunge, 2004). Critical realism maintains a realist is ontologically realist and epistemologically relativist. According to Bhaskar (1998), the reality exists independently from the perception of humans and is stratified into three layers. The real layer contains all structures including material artifacts, objects, social structures, mechanisms, and experiences. The actual layer contains the events generated by mechanisms, which may or may not be observed. The empirical layer includes the subset of observed and experienced events (see fig 3.1.). This stratification represents the argument that not all events are observed our perception of the real domain is based on the interpretation of what is observed.

A second principle of critical realism is the stratification of the structures themselves, which can consist of different interacting structural components. The causal powers of one level of structures can be perceived to be generated by the structures at a lower level (Bhaskar 1979). These strata of structures are not simple aggregation of components but form

assemblages with causal properties emerging from the interactions between components (Volkoff & Strong 2013). The real represents a view of a complex interaction between material and non-material components, where causal powers emerge from particular structures (Bhaskar 1979). The interaction of these generative mechanisms causes the presence or absence of actual events. In the context of this study, organizations and IT are the key structures involved in the value creation and they are combinations of structures with emergent causal properties. Due to inherent interactions between different structures, the focus needs to be on the relationships between the components and how they evolve over time. Therefore, the aim is to reveal generative mechanisms associated with structures and how they interact to cause the observed events (Volkoff & Strong 2013).

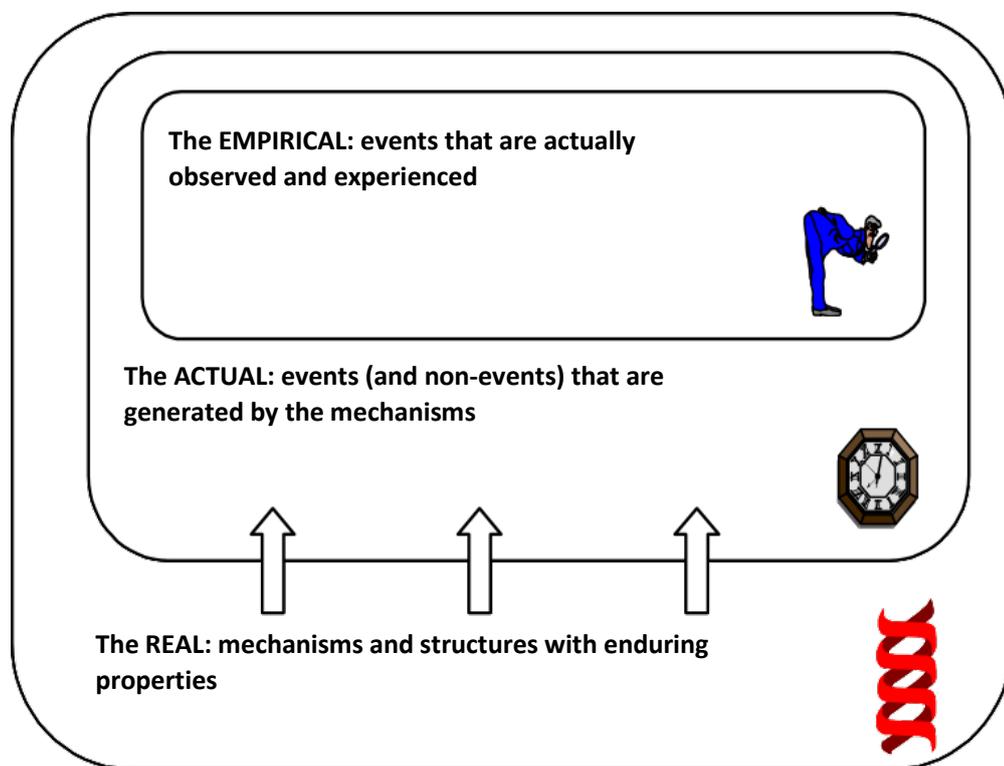


Figure 3.1. The Three Domains of the Real

The epistemic relativity of knowledge means that the researcher’s view of the real depends on their interpretations of what is observed. Therefore, to understand the organizational outcomes associated with the introduction of knowledge management systems and how they happen, we need to understand the generative mechanisms associated with KMS (Volkoff & Strong 2013). These mechanisms can be uncovered through retrodution (also

referred to as abduction) where an unexplained phenomenon is examined by starting from associated observed events and working backward to propose underlying mechanisms that could logically have generated the events (Mingers & Standing 2017). So the direction is from experiences in the empirical domain to likely structures in the real domain. This is not a linear and one-directional process but it allows us to develop an understanding of the mechanisms through iterations. The application of critical realism assumes the existence of an enduring domain of generative mechanisms; the epistemic relativity of knowledge; methodology of retroduction, which explains events by proposing causal mechanisms (Mingers & Standing 2017).

Finally, critical realism distinguishes between agency and structure (Mutch 2010). They are temporally separated as structures have to exist before actions in order to enable them. Actions may cause new emergent structures but then they have to follow the actions. (Archer 1995; Volkoff et al. 2007). The implication is that the explanation of the underlying causes needs to consider the evolvement of processes over time. Structure and agency also have different properties and powers (Volkoff & Strong). Structures are intransitive and they have the power to enable or constrain action (material causality). The agent who act (actors) have the power to maintain or change the structures around them with their actions- efficient causality (Carter and New 2004).

3.2.2. Generative Mechanisms

The previous section proposes that the identification of generative mechanisms allows us to study beneath the layer of observable and propose causal explanations for how and why events occur. Generative mechanisms have been defined as capacities for behavior (Bygstad 2010). Mechanisms have the potential to cause an event but may not realise this potential. Mechanisms can both enable and constrain actions. Generative mechanisms arise from structures which are not observed but the effects of the mechanisms are observable. As discussed in the previous section, the structures are stratified and different layers can give rise to mechanisms and therefore it is important to examine the network of interactive components. The mechanisms can also arise from the interaction of structures or from the interaction of structures and actors.

The causal agent of any social phenomenon is an individual actor but they operate in the macro state which at any point in time has been generated earlier by other individual actions. In this context, one type of mechanism is the set of situational (or macro–micro) mechanisms whereby an individual is exposed to that macro state and is influenced by it. The second type is the set of action–formation (or micro–micro) mechanisms, whereby a combination of individual beliefs, desires, and action opportunities generates a specific action. The third type is the set of transformational (or micro–macro) mechanisms, whereby the actions and interactions of individuals generate collective outcomes (Volkoff & Strong 2013).

In the context of information systems there are very few studies of generative mechanisms and there are no empirical studies in the context of knowledge management systems. Bygstad (2010) identified two generative mechanisms (innovation and service mechanisms) rising from information infrastructures to explain how innovation grows from ICT-based services. Each of the mechanisms consists of different elements. For example the innovation mechanism starts with a “space of possibilities” that arises from the infrastructure’s architecture and operations and enables the emergence of ideas for new services. Then external partners develop these ideas into innovations that are included in the infrastructure as new services, which expands the space of possibilities and this closes the loop. Bygstad’s two mechanisms contribute to the understanding of how innovation occurs from infrastructure but they are at very high level which still does not provide the details of how the specific technology brings about the innovation.

To provide a finer level of granularity and allow the proposal of mid-range theories which address the need to understand the composition of mechanisms, Volkoff and Strong (2013) propose that affordances can help to reveal the generative mechanisms associated with technology for use in organizations. They argue that affordances are a subset of the more general set of generative mechanisms and are appropriate for study of interactions of actors and technology.

3.2.3. Affordances as Generative Mechanisms

This study adopts the concept of affordance originating from ecological psychology

(Gibson, 1986) and adopted in the IS field by studies of interactions of people and technology (Leonardi 2011, Volkoff & Strong 2013, Strong et al. 2014, Bygstad 2017). Affordances are defined as opportunities for action that arise in the interaction between technology and human actors and focusing not on the features of technology but what the actor can do with them. Affordance is a relational term, i.e. it is the property of the relationship between the actor and technology. Leonardi (2011) describes affordances as constituted in relationships between people and the materiality of the things with which they interact. Affordances exist in the domain of the real irrespective of whether they are perceived or actualised. In order for the affordance to be actualised and observed in the domain of the actual, an actor must exist who has the capability and goal to actualize the affordance. Based on all of these premises, Volkoff & Strong (2013) define an affordance as 'the potential for behaviours associated with achieving an immediate concrete outcome and arising from the relation between an object (e.g., an IT artefact) and a goal-oriented actor or actors' (Volkoff and Strong, 2013; Strong *et al.*, 2014).

The affordance itself exists as a potential for action, but the actualization depends on the existence of an actor who perceives the potential and actualizes it. The specific actualization details for each instance depend on the context in terms of the available technology and the organizational conditions. The context can generate various mechanisms which may interact with the affordance actualization and therefore enable or constrain the actualization at any time point of it. (Bygstad 2017). The affordance definition implies the necessity for a technology object and a human actor and as such is particularly appropriate for the study of organizational change caused by use of information technology. (Volkoff & Strong 2013). The basic interaction of structure and action is that the structure enables the action and the action modifies the structure. The outcomes of the action provide a feedback to the structure. The intermediate concrete outcomes resulting from the action can be studied at any level of granularity which addressed the issue with the opaqueness of high level mechanisms. The levels of granularity can be connected by studying the relationships between the stratified object components and the outcomes of these interactions to abstract affordances to a higher level. These interactions are part of the explanation of the emergence of the phenomenon. Every level will have a set of affordances and the level of study depends on the research questions.

Whether an affordance is actualised or not depends not only on the goal of the actor but also their competence and knowledge to realise the potential they perceive. Different affordances may lead to achieving the goal. The consideration of affordances at a lower level allows us to make mechanisms less abstract, to understand the need and capability of actors and the elements of the technology structure. An affordance is a building block of a more complex mechanism (or mechanisms). At the higher level, the outcomes are less concrete and may be results of interactions between several affordances. At that level they are more generalized building blocks of theories but they are still empirically consistent as they are based on the evidence from the affordance actualisations (Bygstad 2017). Recent studies argue for the need to examine the interactions of mechanisms across levels to reveal the complexity of the socio-technical structures (Bygstad 2017).

The same single actor-structure relationship can give rise to different affordances and the actualization and the outcomes are specifically linked to the actor. For example, a chair offers the possibility to sit on it (sitting), It can also be used to stand on it to reach an object at higher level and it can be used as weapon if the actor needs to defend themselves. Also, each of these affordances can be actualised differently by different actors. An actor can sit on the edge of a chair, they can turn it around and lean on the back of it, they can sit cross-legged on it. However, no matter how it is instantiated, the actualization is always of the sitting affordance. The generic sitting affordance is available in the domain of the real to multiple actors and if we observe different actors actualizing it, we can identify the generic affordance by the common functionality and outcome.

Volkoff and Strong (2013) extend the application of affordances from the individual to the organizational level. They argue that when groups of individuals actualize affordances aiming to meet organizational or group goals, the potential for group coordinated action is conceptualized as an organizational affordance. Therefore, there is the potential to study affordances and outcomes at multiple levels and draw conclusions for each unit of analysis.

Affordances have a temporal dimension and as they evolve over time, they interact with other mechanisms. To view the temporal evolution of affordances, a researcher can

consider an affordance when it exists but is not exercised, when it is exercised but not actualised and when it is actualised but not necessarily observed (Volkoff & Strong 2013). The change from each of these points to the next is influenced by contextual factors which act as releasing or constraining conditions for the individual affordance and also for associated mechanisms.

Finally, the proponents of the affordance approach suggest that we need further empirical evidence on the role of specific types of technology to explain organizational phenomena. The role of technology varies depending on the organizational context and the type of technology. The affordance approach allows researchers to study the affordances as elements of higher level mechanisms while each affordance also is a mechanism. It also allows to study the organizational context where affordances are embedded.

3.3. Research Design

The primary aim of any critical realism research is to explain the occurrence of events associated with a phenomenon (Wynn & Williams 2012). In order to explain the phenomenon, the research has to start first with knowledge of the phenomenon and then develop a description of a set of mechanisms generating the phenomenon. In the context of information systems, the purpose of critical realism is to develop explanations of socio-technical phenomena by explicating the mechanisms that generate them. Critical realist researchers suggest that the most suitable approach to study the interaction of structures, events, actions and context to identify and explain mechanisms is an intensive case study (Mingers 2004).

The research questions of critical realist case studies must ask about what caused the events associated with a phenomenon to occur. (Wynn & Williams 2012). Asking about the causes of specific events targets how and why questions associated with explanatory case study research (Yin 2009). In the context of this study, the how and why questions refer to how and why value is created, the events are value outcomes and the research question is: How can KMS provide generative mechanisms for value creation?

The question aims to identify the mechanisms responsible for the key events, which best illustrate value creation. To explain a phenomenon, the associated events must have already occurred and the orientation of the research is retrospective. The causal research questions in critical realism determine the design of the explanatory case to utilise a variety of data sources.

The need to explain how circumstances evolve over time in CR studies has led to the selection of large intensive case studies. The focus is on a single case or a very limited number of cases with specific setting to enable the development of an explanatory theory that matches the empirical facts. Following this guideline for case selection, this study focused on selecting two banks aiming to limit the industry context. Banks are knowledge intensive service industries so it was likely that they will have established knowledge management systems. They operate in a highly regulated environment so it was likely that there will be different data sources for triangulation, which meets the CR guideline for reduction of bias (Wynn and Williams 2012).

To recruit participant case organisation, a senior manager was contacted for an initial exploratory conversation aiming to identify if there is a suitable KMS used. The criteria were that the system has to be enterprise wide and used by a variety of individual employees. It also needed to be implemented for at least three but no more than 6 years to ensure that participants could remember the state prior to the implementation of the system but the system had to be established to ensure value outcomes. Five banks were approached and initially three of them met the selection criteria. One of the banks was dropped from the study after the data collection started as it became apparent that technology was not a major component of the knowledge management initiative.

All participants volunteered for the study and the researcher had no contact with them before they volunteered. Information about the study was sent to the contact who circulated it within the bank and there was a request to email if people were interested in being interviewed. To select interviewees from the volunteers, a purposeful sampling was employed to ensure a broad range of perspectives and richness of information on the subject (Yin, 2011). Interviewees were selected to represent multiple user groups with

variation in the level of experience in the bank and the industry. Other interviewees were selected to represent multiple views on the value outcomes as representatives of groups of stakeholders (for the roles of participants see tables 3.1. and 3.2.).

3.4. Data Collection

Following the critical realist methodological principle of triangulation of data sources, several data sources were utilized: semi-structured interviews, observation, informal conversations over coffee and in social areas, documentation such as training manuals, business cases, memos and other business communications, screenshots of use scenarios.

The semi-structured interviews took between one and two hours with the majority taking one and half hours as stated in the information sheet. Interviews followed the guidelines for qualitative interviews suggested by Myers & Newman (2007). The purpose of this research is to identify generative mechanisms for value creation and therefore the priority for the interviews was to collect rich use scenarios describing how interviewees have used the system, what it enabled them to do, value outcomes. At the beginning of the interview the researcher introduced herself and explained confidentiality and anonymity. After situating themselves and establishing rapport, the interviewer largely left the interviewees to talk about their use scenarios and direct the conversation with subtle probes by mirroring and following up on what was said. Multiple voices were represented until saturation was reached.

In Bank1, 29 interviews in 4 different branches were conducted. The interviewees included the chief operating officer, three other senior managers from the head office, 2 members of the IT staff including the head of the unit, multiple representatives from all user groups. In Bank2, interviewees included the chief operating officer, the chief information office, the deputy chair of the bank, three IT members of staff, two managers of departments, and multiple customer representatives at different levels, call centre staff. Tables 3.1 and 3.2 list the roles and number of participants in each bank.

Category	Role	No
Senior execs	Member of the senior executive team such as chief operations officer and chief information officer	3
Consultants	Call centre	2
	Tellers	2
	Customer service	3
	Department managers	2
IT	IT developer	1
	Digital marketing specialist	1
	Mobile consultant	1

Table 3.1 Composition of the roles of interviewees in Bank1

Category	Role	No
Senior execs	Member of the senior executive team such as chief operations officer and chief information officer	3
	Regional managers(South and Akl)	2
Credit	Senior credit manager	3
	Relationship manager	3
	Associate	3
	Department managers	3
	Facility manager	2
IT	IT developers	2

Table 3.2. Composition of the roles of interviewees at Bank2.

All interviews were recorded and transcribed as soon as possible. Any emotional queues were noted in the project notes as well as reflections after the interviews. The review of the transcriptions sometimes raised follow up questions as there were ambiguities in answers or interviewees may raise questions that they cannot address. In some cases the interview data contradicted previous interviews or data provided in the documentation. Finally, follow up questions were noted where interview data referring to facts needed to be confirmed. The questions raised by the interviews were addressed by follow up emails or phone calls and the answers were recorded in the original interviews. Some of the questions were addressed by other interviewees and in this way each interview informed subsequent interviews.

3.5. Data analysis

The purpose of data analysis is to make sense of the collected body of data and draw conclusions to address the research question. While there is no standard routine for qualitative data analysis, experience demonstrates that analysis of qualitative data follows a five-phase cycle (Yin 2011). The data analysis of this study was guided by the general five-phase cycle (Yin 2011) incorporating the guidelines of the step-wise framework for critical realist data analysis developed by Bygstad et al (2017).

3.5.1. Analytic phases

The general qualitative analysis follows five phases – compiling, disassembling, reassembling, interpreting and concluding. The compiling of data involves integration of data from multiple sources and putting it in order. The second phase of disassembling aims to break down the big set of data into smaller cohesive fragments. In the reassembling phase the disassembled fragments are reorganised into different groupings or arrays. The reassembled material is used in the interpretation phase to create a new narrative which forms the analytic part of the study and includes tables and graphics to represent the interpretations. Finally, conclusions are drawn based on the interpretations. The phases are not linear but iterative. This section describes how the five phases were applied in the current study.

Data was compiled throughout the data collection, adding descriptive tags to interview files and attaching related field notes including reflections and observations. Documentation was collected both in electronic and paper format and photos were taken of screenshots to support observations. At the conclusion of each interview and the data collection for each case, transcripts and notes were repeatedly reviewed to ensure that the researcher was well familiarised with the data. When the data was reviewed as a whole, further notes were added to link information. Notes also included groups of synonyms used to facilitate the coding stage. Paper-based documentation was digitized or a summary as included in a note to represent a data record. Multiple interviews with the same person (e.g. follow ups) were combined into single records. The records were then loaded in NVIVO software and were formally compiled using descriptive labels. The output for this stage was a single collection of records in consistent format.

The next phase of disassembling included the level 1 and level 2 coding. The purpose of this stage is to abstract elements of the data from the single record instance and move it to a higher conceptual level which will facilitate grouping and comparisons. The initial codes (nodes) assigned to data elements were open codes closely resembling the data items, sometimes reusing the words from the data. These nodes were then reduced by removing similar or matching nodes. Then the nodes were reviewed in terms of how they relate to each other and were organized into higher level categories (level 2 codes). For example, the level 1 codes would have included numerous value instantiations and after a review, some of them would have been found to all represent different examples of increase in revenue and would have been grouped together in one node. However, some of these nodes such as increase in revenue and cost savings would be examples of financial performance measures and they would have been kept as subcategories (nodes) within the financial performance node. Financial performance node is then identified as subcategory of organizational performance. Thus all the nodes were organized in a hierarchical tree structure. This was a highly iterative process starting with open codes and then reviewing and querying the categories to establish the hierarchy. At the later stages of the disassembling, the process was informed by the research question, the literature review and the theoretical lens of affordances. Codes and labels were categorised as value outcomes, contextual factors and affordances.

The reassembling and interpreting phases of this study have been guided by the stepwise framework for critical realist analysis (Bygstad et al. 2017), which is presented in the next section. It provides the lens for searching, identifying and corroborating generative mechanisms explaining events. These phases include more discretionary choices and judgement. To reduce bias Yin (2011) recommends the application of three procedures: comparisons, negative cases and rival thinking. This study aims to explain how and why KMS generate value. Therefore, the interpreting is of type “explanation” (Yin 2011). Developing of good explanations requires external perspectives to reveal gaps or incompleteness. In this stage, the preliminary analysis was widely disseminated through seminar presentations and interactions to strengthen the process and the outcome of the explanatory interpretation.

The concluding phase of the research develops a series of statements presenting the significance of the findings of the study. With reference to prior research and the findings from the analysis, the conclusions may challenge prior findings and assumptions, call for new research, present new theories and concepts, generalizing to a broader set of situations.

3.5.2. Step-wise framework for critical realist data analysis

This study used the step-wise framework developed by Bygstad et al (2017) building on the guidelines by Wynn and Williams (2012). The guidelines offer a specific procedure which is dependent on the context of individual studies and therefore its application will vary. This section briefly describes how the framework was employed in this study with a summary presented in Table 3.3.

Step 1: Description of Events and Issues that Constitute the Phenomenon of Interest

The phenomenon of interest in this study is value creation. Once the disassembling phase was completed, the first step was to identify major value outcomes. The data was also analysed to identify events that formed a timeline for the KM system, contributing social and technical structures.

Step 2: Identification of Key Entities

In Step 2, the researchers identify associated entities (actors, organizational units and objects). Key actors identified included managers and representatives for all groups of users, technology artefacts.

Step 3: Theoretical Re-Description (Abduction)

In this step, the researcher identifies relevant theories to observe, describe and explain the events. The events were analysed over time to generalize in abstract terms the nature of the phenomenon. This steps may include reference to extant literature to inform the specific questions. The observed value creation and capture were at different levels and the research question needed to be reframed to identify mechanisms generating value at different levels.

Step 4: Retrodution: Identification of Candidate Affordances

After Step 3 the research question in our case could be reformulated as: which mechanisms can explain value creation? This step includes identification of the functional outcomes, then retroduting the affordances. Retrodution is a mode of inference specific to critical realism which explains events by proposing mechanisms which can generate them. To retrodute the candidate affordances the following substeps were completed:

- *Identification of Immediate Concrete Outcomes resulting from the actions of goal-directed actors.*
- *Examination of the interplay of human and technical entities involved in producing each outcome.*
- *Identification of Candidate Affordances as potential actions that result from the interaction of human and technical entities to produce the concrete outcome.*
- *Identification of Stimulating and Releasing Conditions which can influence whether the potential for action is actualised.*

Step 5: Analysis of the Set of Affordances and Associated Mechanisms

The affordances identified in the previous step are viewed as the building blocks of the explanation. In this step they were further analysed by:

- Analysing the dependencies between affordances.
- Grouping affordances into higher level categories.

- Identifying relationships of affordances to other mechanisms.
- Abstracting affordances into higher-level generalised mechanisms.

Step 6: Assessment of Explanatory Power

This step includes assessment of the explanatory power of the mechanisms based on the empirical evidence. Wynn and Williams (2012) described this step as *empirical corroboration*, that is, ensure that the proposed mechanisms have causal power and that they have better explanatory power than the alternatives. In this step the empirical evidence supporting mechanisms was further reviewed and questioned and alternative rival explanations were sought.

Step	Description of application
Description of events and issues that constitute the phenomenon of interest	Identification of the main value generating events and the contributing social and technical structures. Some of these were identified from the interviews and others from documentation and observation. Examples – launching new products, training events, creation and incorporation of knowledge elements.
Identification of key entities	Actors, organisational units and objects
Theoretical re-description (abduction)	Framing the questions within the extant theory What are the mechanisms leading to internal and external value outcomes?
Retroduction: identification of candidate affordances	1. Immediate concrete outcomes were identified (specific outcomes of the interaction between human agents and the system). 2. Interplay of human and technical entities involved in the production of the outcome 3. Identification of candidate affordances 4. Stimulating and releasing conditions.
Analysis of the set of affordances	Grouping affordances Abstracting affordances into higher level mechanisms Analysing dependencies
Assessment of explanatory power	Selecting affordances and mechanisms with the strongest empirical corroboration

Table 3.3. Stepwise framework for data analysis

3.5.3. Case-to-Case Synthesis

The research was designed as multi-case study addressing a common research questions and intending to describe and analyse value generating mechanisms across two instances. The same data collection and analysis procedures were utilised in both cases. The stepwise framework was used for within case analysis. The within-case analysis led to identification of generative mechanisms and interdependencies representing each case space.

Then the data was integrated as a collective data set and re-analysed to obtain generalized results at the collective case level. Case synthesis does not aim for statistical generalization but for accumulation of knowledge with broader applicability beyond each single case. The combined cases were considered as one collective case to extract and develop integrative understanding. A thematic case-to case synthesis was applied to aggregate findings and make sense of the data without losing the contextual situational information richness. It involved iterative in-depth interpretive examination focusing on the themes around the research gaps.

Chapter 4 Knowledge Creation System at Bank2

4.1. Organisational Background

Bank2 was established in 1850 and is an independent New Zealand (NZ) owned bank. They started as a local bank in the North Island. In 1984 the financial sector was deregulated and as a result most banks merged and were later sold to overseas institutions. Bank2 merged with some regional savings to survive the new economic conditions and stayed independent. In 1986, they set up a community trust as the bank's shareholder and targeted customers across NZ. In March 2013 the bank customer deposits grew to NZD 4.9 billion.

Bank2 takes pride in their customer service. They consistently rank the highest in surveys of customer satisfaction. The most recent Customer Satisfaction results show that Bank2 achieved a rating of 93.4% - well above the average satisfaction rating of the big banks of 78.3%. The Bank was again named 'People's Choice' in the Sunday Star Times Banking Awards for the second year in a row - judged on service, value and product.

The structure in the organisation is quite flat with few management layers; there is an open door policy. All senior staff work very closely together on decisions and are approachable to branch staff.

"The culture in the bank ...it is like family, light on structure. Everyone is approachable. We have a very engaged workforce. "

The Technology team consists of an Information Technology (IT) Services team, Software Development team, Architectures and Solutions and the Digital Support team. There are 25 members of the team in total. The Digital Support team who support internal customers in understanding the online products for customers are planned to be moved to the contact centre where they can help the customer service staff directly. The team is led by the CIO Mary Campbell (Name has been changed).

The CIO is part of the executive team of the bank and has an input in the business strategy

and the use of IT to support strategic objectives. The executive team has monthly team meetings to discuss funding and initiatives. Some decisions with regards to IT are made directly by the CIO (e.g. infrastructure decisions) and some decisions that affect banking operations or the finance chain are discussed within the executive team. Initiatives that require new funding require approval of the executive team. However, the Technology team also has a general operating budget.

In 2009, the newly appointed CIO of the organisation recognised that there is no channel for employees to share ideas with the members of the senior management team. The CIO has a background in change management, and she sees IT as a business enabler of transformation. She was the champion of an initiative to create a platform which allows front line staff to post suggestions and ideas as to how the business can be improved. As many of the products that the bank provides are electronic and IT based, the initial motivation for the KM initiative was to gather feedback on the internet banking products. Some comments from customers were passed on to the Technology team but in a “sporadic way” and generated “noise” about internet banking. The IT team aimed to get more comprehensive and consistent feedback in order to make improvements to the existing tools. Hence, they proposed to set up a forum where front line staff can share the feedback and suggestions from customers with regards to the IT tools offered to them.

“As a small bank, we’re very, very close to our customers, but even in saying that, [it seems to me in my office] I’m still quite removed. One of the things that we wanted to do was provide a forum that I could get, and it sounds a bit selfish, but that I could get feedback from the front line on what was working, what wasn’t working. “

As a first step in offering this communication channel, a form was provided as part of the intranet tools. Users needed to download the form, complete it and then submit it for review. However, this was not user friendly and most staff were not aware of its existence. Then the IT team proposed the development of a messaging forum which will allow easy transfer without it being too structured or time consuming. When the initiative was discussed within the senior management team, it was decided not to specify what kind of ideas and feedback were expected and the concept was to provide “a forum for anyone to put in an idea about

anything”, including proposals for new products and services. This broadened the scope of the initial proposal beyond feedback to the IT department and included communication and ideas from all staff. The implication was that the ideas and feedback will be posted in one place and then distributed to the senior managers who were responsible to review and follow through on the idea. The requirements were also that staff will be able to discuss the suggestions on the forum and share their knowledge on the topic.

To support the proposed knowledge sharing initiative, the IT team designed the Idea Generator (IG) knowledge management system. The Idea Generator was designed to resemble a social media platform allowing staff to post ideas and suggestions visible to all other users. Other users could post messages as comments on the original idea or on comments from other users. The aim of these exchanges was to encourage both sharing of existing knowledge and creation of new knowledge. Users could comment expressing support or posing questions to support knowledge sharing. Alternatively, they could also post further suggestions to the original idea and collaboratively create new knowledge. If users simply wanted to show support without further information, they can also vote yes for the idea.

The development of IG took only a few days as the initiative started out as an experiment to see if staff will use it. There was no clear idea how popular IG will be and so the team did not want to “lose valuable resource days” if there was no interest.

“Some of the features we didn’t spend a lot of time on, it was mock something up in a couple of days, we didn’t go out and look for tools off the shelf but it was really just a let’s see if anyone uses it.”

The IG was introduced early in 2010 (for a timeline see Fig 4.1.) as part of the intranet tools available to staff. An email was sent to all staff to announce the new tool and there was no further promotion of it. There was a very enthusiastic response to the tool. Initially there were a number of suggestions as to how tools and processes can be improved which was the original intention. In addition there were also ideas for innovations in products and services. Posted ideas and suggestions generated many additional comments. Three years after the implementation of IG several new service tools have been developed and introduced. A

number of new products have been developed and introduced for different customer segments. Several ideas have been incorporated in the planning road maps for the next few years.

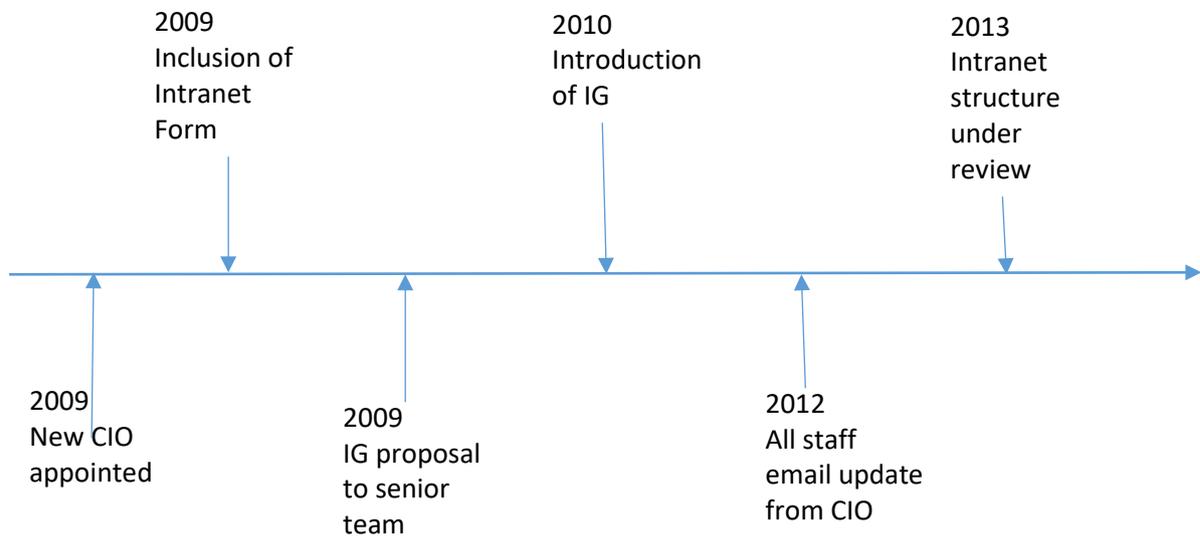


Figure 4.1. Timeline of events related to the introduction of the Idea Generator (IG)

With the growing popularity and use of IG, staff contributed not only ideas and suggestions but also placed questions and complaints. The volume and variety of contributions exceeded expectations which presented a challenge to the CIO. Originally, the intention was that she will review the ideas and comments occasionally and forward them to the relevant department. However, the number was overwhelming and she lacked administrative support. At the end of 2012, there were 400 ideas and 1500 comments which were not processed. She used the Christmas break to organise the ideas and comments in a spreadsheet and presented them to senior management. She emailed all staff to let them know that ideas and comments are being reviewed and this encouraged more contributions.

“It’s still used a lot. Yeah. At Christmas, I deleted 1500 comments and there are still pages and pages all new – this year. It’s only May and we’ve got pages and pages.”

The unexpected number of contributions made it evident that the current practice was unsustainable and jeopardised the value generated by IG. The delay in processing of ideas led to frustrations in staff contributing to IG. Some of them expressed doubt that there was a

point in participating as “it is not going anywhere”. The CIO had to reassure staff in an email: *“We apologise that you don't see a response to every enquiry but the sheer volume of ideas makes it difficult to constantly review - but we do review them and we do listen!”*

Another major issue was that both managers and staff found it difficult to follow and find ideas and comments relevant to them as they were overwhelmed by the number of pages available. As a result, many ideas were not considered by the relevant senior staff or if considered, staff were not notified. From the contributors' point of view, they would not be able to see if an idea they wished to propose already existed and as a result there were many duplications of the same ideas. From the IT point of view, who have been given the task of processing the contributions, this is an added cost which they cannot cover. More than three years after the implementation of IG, the department is considering options which will build on the success of IG and improve its operation.

“The way it stands at the moment we have to invest a lot of resource into the intranet we are looking at we are trying to look at something off the shelf, so that we can take that cost away and focus those resources back on to customers, and improve our customer experience, and get more profit out of them.”

This last quote emphasises that the bank employees and management are focused on creating and delivery of value primarily to customers through products and services and optimal use of resources. The next section presents the value outcomes resulting from the introduction and use of IG.

4.2. Value Outcomes

Interviewees reported exchange and utility value outcomes at both individual and organisational level. They largely fall into two categories – customer exchange value through products and services provided to them and organisational value through optimising of resource use.

4.2.1 Tangible Outcomes

One consistent value theme is **new products and services** introduced as a result of the introduction of IG. A number of new investment and saving products were developed and offered on the market leading from concepts proposed through IG. The lending department are also considering ideas for new products – *“some of them are updates on existing ones, some are not.”*

“There’s been a lot of comments about xxx — product based and developing a new product – a customer comes in and wanted that product and we haven’t been able to give them, develop it and get into that area of the market. Those are all - to me big changes.”

Customers were offered products that were more appropriate for their needs and circumstances. In the case of one product aimed at children, there was no alternative prior to its introduction. The result is that *“when the ideas are implemented it’s happier customers, more customer retention, better word of mouth.”*

A lot of modern banking services are provided online and Bank2 constantly reviews the customer journey online. However, the digital specialists, who do that, do not interact with customers and are not always aware of frustrations for customers. For example, there are a lot of customers who have NZ accounts but work overseas and they still transfer savings to their NZ accounts. The process was largely manual and required customers to contact the bank by phone during office hours which is very inconvenient when there is a time difference. As a result of feedback and explanation of the requirements of customers, **a workflow online tool** was created which included all steps of the process with explanations and checked that all information was completed before moving to the next steps. This was one of the *“suggestions that add value to our customers, to better their experience with [Bank2].”*

Other online tools such as calculators have been introduced both for the convenience of customers and staff. *“There’s been things like little calculators to be designed to – online calculators to help us work out things a little bit better like, rather than manually. Most of them are about streamlining the process more.”*

Another value outcome related to product development is that products are now developed by teams which are structured differently and include customer input. As a result the bank “gets the products right the first time” leading to increased customer satisfaction, reduction of the product development time and resource input. Creating new online tools not only delivers convenience and continuous help to customers but also releases internal pressures and frees time for staff.

“Within the first couple of weeks of it [an online tool] going up the XX (department) people were rather pleased because the impact for them is that it takes away queries for them. On a very regular basis they were emailing out the information and taking calls from different branches so that workload has been reduced for them.”

Many suggestions that are put forward through IG are based on feedback from customers and staff on frustrations they face and how they would like the processes to work better. This has led to **changes** both in the steps (process) that are followed but also in structural changes to ensure that staff who need to work together are physically placed together. For example, one customer service team expressed frustration that customers always call them first even if they have questions that are related to different areas. This leads to customers being transferred, wasting time and having to repeat their issues. Following a discussion, the two teams were put together and the intake of calls was modified. Such improvements “*change how [Bank2] looks to people and how staff are doing their job.*” Another example of a necessary improvement was that that when customers made online payments, they had no way of depositing a large amount and had to make several payments of smaller amounts rather than a single larger payment.

Some of the changes made were to existing processes. Improving the level of service is a priority and “*a lot of it is to do with making things more efficient, just so that you can work faster and be able not have things sitting round for days on end.*” For example, the process of opening accounts was streamlined to save steps and holdovers.

Building and development of human capital was reported as a value outcome by all participants. Individuals using the system either improved their knowledge of existing

products and procedures within their area, the way the business operated in general or how they can use some of the existing tools. This had two positive impacts – improvement in the knowledge and expertise of employees and reduced resources used for training.

“I was told we have this already. An idea that was already in place I was not aware of and the customers were not aware of it.”

“Suggestions of how you can do things ...are just free training.”

4.2.2. Other Organisational Outcomes

The use of IG has resulted in much greater engagement from staff at all levels. Staff have reported feeling empowered as they participate in the decision making and they are listened to. Repeatedly participants stated that IG gives them a voice. Interviewees reported that IG makes them *“feel more important”, “feel you are part of trying to make the whole bank better”* and *“it allows you to feel part of the bank a lot more than someone who is paid every fortnight.”* Engagement is acknowledged as an intended intangible deliverable that was planned by senior management. This was one of the reasons that they did not ask for a detailed business case and preferred to go with a cheaper in-house solution to start with *“as intangibles such as staff engagement could be quite high.”*

“[IG] made a huge difference, it brings everyone together, it gets everyone feeling like their ideas are welcome. Make them feel more important as well.”

Improved communication was also reported as a positive outcome at the organisational level which in turn leads to improved processes. It helps people to apply existing processes consistently and to understand current practices. *“[W]e have lots of branches in remote locations and even this technology department is separated from our head office. From a value perspective if we have technology solutions to help that interaction it’s definitely a positive for the banks business process.”*

Interviewees reported that a major benefit of using the IG was improving relationships and growing social capital. The bank branches are distributed throughout the country and it is hard to know people in the same positions from other locations. The use of IG has provided a

platform and context for employees to get to know each other and help each other. They have received affirmation when their colleagues have “liked” and encouraged their suggestions.

“Now we know that IG is providing good value to staff to have their communication. Now we can justify a new tool to extend to collaborations. This also helps to break down silos.”

The transparency and open communication through IG has also led to better relationships between different units. It has increased understanding of what other people do. *“[W]e are not experts in every area, different areas would have different knowledge of this item”*.

“When people are not happy with something that’s also really valuable to us. We can manage frustrations by the comments that are there.... [Recently] there was some frustration in [a department] so we were able to go over and hijacked their last monthly meeting and we were able to have that conversation and now they understand and are happy with us.”

Finally, the repeated use of the IG as “watchers” has raised the innovativeness capability as it has encouraged people to actively think of new ways to do things. *“Viewing others’ ideas hits a nerve with something else and I think that would be great if we did this as well, encourages more ideas. It also encourages thinking of other ways of doing things.”*

4.3 The KM System: Material Properties and Basic Affordances

The main goal of the system was to encourage participation by staff to contribute ideas. When the system was first introduced users were asked to focus on “positive” suggestions rather than complain about existing products and practices.

The priority for the design of the system was that it will be easy to use and everyone will have access to it. The idea generator (IG) is similar to a social media platform. It allows all members of the organisation, including those who do not have email addresses, to post ideas. Once an idea is posted, everyone can vote or like the idea, they can contribute further comments to improve the idea or to express their opinion. **Table 4.1** presents the technical features of the

KM system and a description of their original design purpose.

At a basic functional level irrespective of individual goals and abilities, the material features of IG provide users with affordances of **accessing, recording** and **viewing**.

To **access** the system users only need their login details which they use to access any other of the bank systems. It was important to make it as easy as possible to access the system as some staff do not have email accounts and using email addresses was not an option. The way IG is setup, allows anyone in the bank to access it on any internet enabled computer by requesting their login ID details. IG is one of the tools on the intranet and for many workers with their own networked computers there is no need for further login. However, for front line staff this is slightly more complicated. They do not have access to the intranet or internet at their desks as their computers are only linked to the customer data systems. To access the system they need to use one of the shared back line computers outside of their workspace.

In terms of **recording**, users are allowed to record an original idea, record a proposed modification or an opinion of an existing idea. To record a new idea, a user only needs one step to fill a field and submit it. An optional feature is to label the idea as private and then it will be submitted only to senior management. Users can also tag (link) their post to a category. They can select from a list of categories already created by other users or type in a text description and automatically tag their post to that. To record an opinion or modification, they need to first select to view an idea. When the idea is opened, there is field which can be used to comment on the idea. This is a free text field without a word limit so users can contribute any comments including criticisms and or suggested modifications. Another way to express a positive opinion is to select the Vote feature within the idea.

The features related to **viewing** allow users to view all or selected contributions, statistics about the idea and the contributor of the idea. When they first access the system, users can select to view ideas or topics/categories. When a topic is selected, users can view a list of all idea posts which have been tagged with this topic. When an idea is displayed users can see the idea, all comments in a thread below it and the authors of the idea and the comments. They can see how many times this idea has been viewed, how many votes have been placed

for it, the date when it was placed and the time since the last activity on the page. In addition, they can see the names of all contributors to the thread and their reputation score.

<u>Material feature</u>	<u>Description</u>
Idea entry	It allows all members of the organisation, including those who do not have email addresses, to post new ideas.
Categorisation of post	There is a field which allows users to add a category to describe their idea but there isn't a list of limited number of pre-set categories (free text and optional)
Comment	Allows all staff to comment on a posted idea (free text) in a forum section under the original idea.
Vote	Allows staff to vote for an idea without posting comments. Each employee can vote only once.
Privacy option	Allows staff to select a privacy option and post ideas that are only visible to the members of the senior management team. Other users can see which person has posted a private idea but they cannot see the idea itself. Disables voting, comments, reputation.
Structure	By default posts are sorted and displayed in chronological order (most recent first)
Search	A field displays created tags/categories created by users and when a category is pressed, posts tagged with this category are displayed.
Share	Within an opened post there is a link which allows users to share it with other registered users.
Reputation	Displays the reputation coefficient of a contributor. A reputation coefficient is calculated and displayed for each user. The coefficient is calculated based on number of contributions and comments and the number of votes on contributions.
M's tick	Allows the CIO to activate a green tick in an area called M's area to indicate that the idea has been approved.
Views count	Displays how many times an idea has been viewed.

Table 4.1 Technical Features of the IG KM System and their Purposes

The use of the IG system is voluntary and users have a choice to actualise these basic affordances. The expectation from management was that the use of the IG system will be very limited as there will not be many original knowledge creating ideas. The designed features of the IG system have been used in different, sometimes unexpected ways by a

variety of users based on their individual goals and understanding of the purpose of the features. The following section will consider concrete outcomes and the interactions of users and material properties which produce these outcomes to identify actualised affordances.

4.4. Retrodution: Identification of Actualized Affordances

Section 4.2 outlined the value outcomes, which were attributed to the introduction of IB given specific examples. However, these organisational outcomes are not necessarily a direct result of the interaction of a human agent with the material properties and would require further action before the value is generated. This section identifies the concrete outcomes associated with the value generated by IG and the specific goals of the human actors. Then based on retrodution from the outcomes the interaction of entities that led to these outcomes is analysed to identify the candidate affordances and to examine how they have been actualized (presented in table 4.2.). The actualisation of affordances is dependent on both individual and contextual conditions such as the actor's goal and the releasing conditions.

One major goal at both the organisational and individual level for IG was to develop and introduce new products and services. An individual employee who has an idea of a new product or service enters a suggestion as new post in the IG and this interaction produces a **product concept**. Based on the data a releasing condition to this action can be feedback from customers on an unfulfilled need or reflection by employees on current practices. This **proposing** affordance by itself produces a concrete outcome. However, in many cases the product concept is derived by further collaboration through further contributions by other employees in the comments section (**commenting additions**). In this case the releasing condition is that the employee views a suggestion in a subject area that they have knowledge in and they propose modifications or elaborations on the original idea. For example, a post suggested a class for seniors on how to use a specific product and then other people added what specifically needs to be addressed in these classes based on the questions and feedback they have had. The original idea complemented by the comments forms the final product or service concept. Idea Bank has afforded opportunities to expand the product development into a cross-unit and a cross-boundary collaborative process and effectively to create a different product together.

“Lately there have been customer suggestions, seeing what customers think of how to improve the bank.”

Not all proposed ideas are implemented as products. In 2012 alone, 400 ideas and 1500 comments were contributed by members. The next concrete outcome in the idea development is for it to be selected for consideration. Originally, the intention was for the CIO to review all ideas and to forward them to senior managers in the respective area (e.g. operations, marketing). Then each senior manager can approve or forward it to the senior management team for consideration. However, the number of contributions was much higher than expected and as a result the **selecting** affordance has been actualised by different actors. The CIO and other senior managers intermittently view ideas that are clearly tagged with a category that relates to their department area. The CIO also looks for ideas that have generated a lot of votes and comments to select which ones to forward to department managers. This shows that the **viewing** affordance has been actualised selectively by the senior managers and the selecting affordance is dependent on either **tagging** ideas or **supporting** ideas.

Tagging of ideas has been actualised inconsistently both in terms of the approach and frequency. Observing the contributions at one particular point demonstrated that more than half of the posts were not tagged. There is no generic pre-set list of categories but users can select from a list of categories created by other participants. Participants who had created tags very often use very specific long titles without looking to see if there is an existing tag that suits the idea. As a lot of them are very specific to the idea rather than a functional area, even when participants looked at the existing tags they could not find any category that was suitable and created another one.

One path for consideration by senior management is for an idea to be widely supported. To **express support** for an idea most employees have used the voting feature as originally intended. Thus, the support is represented by the number of votes by itself and as a proportion of the number of views. However, some actors have also used the commenting affordance as a way to express support. Some of them simply stated that they strongly support the idea while others have used this feature to add further reasons and examples

why this idea is needed and as such providing qualitative justification for the proposed concept.

"I have gone on occasion and see things and think- actually, I've thought about that in the past and you can add to it or comment or vote it up."

Some staff have used the Share feature allowing them to bring an idea to the attention to other users outside the system. The purpose is to communicate the idea as it is sometimes hard to find ideas and to encourage staff to vote for it. The result is higher vote count for the idea.

"Something we feel strongly about, we message each other to look on idea bank and that gets the word out, and the rest of us vote on it. That works quite well, especially up here we have quite a few staff in one area."

If an idea is approved for implementation, senior staff sometimes want to indicate this result to the original contributor. The purpose of this is to provide feedback and to demonstrate progress. The system does not provide a material property which allows this feedback to be placed by anyone apart from the CIO. When the idea is in the area of IT expertise and it is approved, the CIO has actualised the affordance by displaying the green tick. However, the constraint is that the green tick indicator does not allow any qualitative feedback including timeframe. Also, there is no feature to show if the idea has been rejected. If the tick is not displayed, then it can mean one of two things – the idea has not been considered yet or the idea is rejected. Senior members other than the CIO cannot use the feature anyway. Therefore, some managers have used the commenting feature **to provide feedback and to notify the contributor**. This affordance of the commenting feature is not actualised consistently and when it is actualised, it happens well after the original contribution so the intended concrete outcome is not always achieved as staff do not see the comment.

"I came across one the other day that had been approved and we did not know about it. There is a lot on there that has been approved and whoever approved it, wrote on there this has been approved."

"Someone told me that my idea was approved and I went back and searched for the idea and found a comment from C (COO) yes we like this and will work with it. I didn't get a message so

I could have gone without knowing.”

During interviews and observations, respondents showed that when they want to check if an idea has been approved or if there have been further comments added to the original idea, they try to remember when the idea was originally posted and go through pages of posts to look for posts from that date. In some cases they filtered by tags first before **searching** for the date. This is quite time consuming and some of the respondents reported that they give up after some time.

The actualisation of the proposing affordance has produced some unexpected outcomes based on the actors' prior knowledge and goals. One consistent actualisation has been that employees propose ideas for products and services that already exist. Their goal is still to propose a new idea but they are not aware of the product's existence. By itself this produces the same outcome-proposed idea. However, in this context the commenting affordance has been actualised by some more experienced/knowledgeable employees to explain that the product/tool already exists and where it can be found. The concrete outcome in this case is help and advice for employees and **improvement in their knowledge** and the affordance that is actualised is an **advising affordance** of the comments feature.

“It can be used as a way for people to learn as well, occasionally get peoples' ideas on there, you can do that already, you can do it this way. It is quite good [to be able to say] actually if you do it like this you can do it.”

A variation of the actualisation of the advising affordance is a situation when a proposed service only exists in one branch of the bank and not others. In this case when an employee proposes the service, this is genuinely a new idea for them and the branches that do not have it implement it. In response the **commenting** affordance is actualised by some employees to express support or provide further suggestions as usual but differently by the employees of the branch where it is implemented. The concrete outcome in this situation can be **“evidence to support the idea”** resulting from **communicating** and ultimately leads to standardising practices by branches adopting the same practices. In some cases the outcome is a **modified improved idea** which can be used by all branches. For example, in the case of the classes suggestion mentioned earlier, there were first responses suggesting how it can be done and

then one member responded that they already had similar sessions they offered. Thus the commenting feature then is used to actualise a **collaborative creation affordance**.

With the increased popularity of the system, employees reported that they saw potential for different uses of the posting feature. Many of the front-desk employees reported that they used the feature to post feedback from customers in addition to suggesting ideas. Their goal is to communicate the feedback from customers to senior management. Some of them said that they did not have a suggestion how to address the feedback and so they just shared what it is and others said that they did not have time so just literally typed what the customers were telling them. The concrete outcome in this case is access to direct customer feedback and the posting feature enables the actualising of a **communicating feedback**. This can then lead ultimately to resolving an issue.

“Yeah so problems are identified by the business, people interacting with the customers alot, say ok we have this problem.... I can architect up a solution to resolve that issue.”

Sometimes the feedback uncovers a communication issue and lack of understanding within the organisation. For example, in one case customer service representatives passed on customer frustrations in using authenticating tool as they did not understand how important this tool is for the security of the customer information. When the feedback was posted, other customer service representatives also commented that they had the same feedback. This highlighted the issue to the IT team and they **responded** to the customer representatives to explain to them why this is necessary and how it helps customers so that they can advise customers as well. The outcome was **learning and better understanding** for both sides.

“They have called our frontline and they in turn have posted comments. We replied and explained what were the reasons that we had to implement it and this has made a difference. When you walk through the reasons and share our view they say ‘ah, ok’. It had a side benefit. So, with all these ideas we get other things out of it that were not our original intention – in this case a bit of education.”

Although the original instruction was to post positive ideas and suggestions, the feature of posting has allowed some employees to voice their own frustrations with systems or

products. They have used it to actualise a **providing feedback** affordance from employees. As with customer feedback, sometimes this has led to resolving issues. Specifically with respect to the IT department in some cases it has led to improved attitudes to the IT department and **improved relationships with IT staff**. This is only possible if there is interaction – both providing feedback and responding to it have to be actualised.

“X saw some comments that were offensive to her as they were very anti-IT. She took offence and we engaged with the business unit. We wanted to re-engage with them and get more communication and better understanding and this was all driven out of IG. This is also a side benefit to the original intention.”

Another potential of the posting feature that has been actualised by staff is **to ask for help**. Some staff have used the system as a forum where they can address their colleagues when they have a problem and ask how to use a tool or how to provide a service to a customer. Sometimes this has been triggered by a request from a customer or in the process of trying to use a tool.

“It is about bouncing off different staff members, we are not all experts in every area – they could suggest a way of doing it.”

Consequently when another user **provides advice and help** in the comments section, then the immediate outcome is **intentional learning**. This is a very similar situation as to when someone responds to an idea which already exists but in this case the goal of the first user is different as they mean to ask for help.

“The processes she was currently using weren’t quite right, it was a case of saying hey this is kind of what we do, or how maybe you could do it in future. That might help with your problem. She responded and a couple of other people got in and said that they weren’t aware of this.”

While there has been a lot of interaction and communication as intended, a lot of staff are mainly using the viewing feature, they are “watchers” only. Some watch simply to view ideas and vote and this immediately increases staff engagement. Their goal is to communicate

support to their colleagues and the outcome is that there is visibility of the level of support. This is expressed by the **improved status** rating of the original contributor.

“Some of the staff are just watchers- they just look at posts and vote, mark with likes. Some of them never contribute but they read the posts regularly. Now we know that IB is providing good value to staff to have their communication.”

Some of the experienced users are specifically monitoring the posts to see if someone needs help.

“I normally just watch and vote on ideas. I only comment if there is already something in place for that that people don’t know about, or if the information that they have put on there is not quite right.”

Pursuing this same goal of intentional learning some staff are “watching” posts with the goal to learn about what other people are doing and understand different parts of the business better. For example, one of the call centre employees commented that *“it is good you get a big range of ideas from everyone, not just a select group. I wouldn’t know what admin staff need in terms of being able to do their job. Having ideas straight from them is great, they do that every day.”* In this case the learning affordance is driven by desire to fit in better with other employees and provide them with input for their work that is more suitable. Ultimately this leads to process improvement and greater employee satisfaction.

The viewing affordance has been actualised with the goal of **selecting product development team members**. When an inter-unit group is being formed, senior staff use IG to view contributors in a particular topic with high reputation status. The immediate concrete outcome is that a group member is nominated but this outcome is dependent on the outcome of the actualisation of the tagging and expressing support affordances.

Immediate Concrete Outcome	Action to Actualise An Affordance	Goal Directing the Action
Concept of a product/service	An employee enters a new idea Employee(s) add comments to a posted idea	To propose a product
Supported product/service	Employees add comments to express support and in some cases to further justify the need for this idea Employees use the vote feature to show support for the idea.	To express support
Selected idea	Clearly categorised ideas are viewed by the respective senior manager Supported ideas are viewed and forwarded by the CIO.	To select ideas for approval
Improved knowledge of existing products	An employee posts an idea of a product which already exists. Another employee responds in the comments section to explain it already exists and where to find it.	To help a colleague
Resolved issue	An employee posts a request for help with an issue. Another employee responds through the comments to provide advice.	To find a solution to a problem. To help a colleague
Improved knowledge and understanding of existing operations	Viewing posts to understand the operations and needs of organisational units	To learn
Status/ reputation value	An employee whose status will change posts ideas and comments Other employees use the voting feature to express support	To improve products or services To recognise valuable contributors
Selected team member	Senior managers monitor and view posts by high status contributors	To ensure active and valuable input in the development process

Table 4.2. Actualisation of Affordances

4.5. Analysis of Affordances and Associated Mechanisms

4.5.1. Grouping and Abstracting Affordances into Higher Level Mechanisms

The previous section identified actualised affordances resulting in concrete outcomes associated with value creation through interaction with IG. The data presents a great number of use cases showing that affordances can be actualised in multiple ways through interaction with different material properties at the individual level. In the first instance these individual actualisations were presented in groups related to functional outcomes. In this section, the specific affordances are aggregated to represent consistent strands of affordances using similar types of process and functional outcomes. Then they are abstracted to higher level generalised mechanisms which can serve organisational goals (Table 4.3.).

The proposing ideas affordance includes posting ideas for new products, services or modifications to existing ones. It also includes proposed ideas coming from the actor or from customers. The outcome of all these variations can be generalised to a new product/service and the affordance is actualised through the interaction with the posting feature. Similarly suggesting additions and modifications to an idea lead to the same outcome. Therefore, they can be abstracted to a generalised **knowledge creation mechanism** which contains all these affordances as elements.

Evaluating ideas, expressing support, adding justifications and evidence and selecting team members based on their participation and status are all affordances leading to a selection decision. They all include input and participation by multiple members and therefore are collaborative in nature. They have been abstracted as a **collaborative decision making** mechanism.

The **communicating** mechanism includes affordances related to interaction and sharing information. The outcome of all of this is a form of improved understanding and relationships.

The **learning** mechanism consists of actualised affordances related to context-specific knowledge seeking and knowledge transfer resulting in improved procedural and factual

knowledge of existing products and services. These include both intentional, unintended, proactive and passive learning. The releasing condition of all of this is the awareness of a gap in knowledge.

<p><u>Basic functional affordances</u></p> <p>Information access Recording information</p>
<p><u>Knowledge creation</u></p> <p>Proposing including tagging as element Posting customer suggestions Commenting additions</p>
<p><u>Collaborative decision making</u></p> <p>Evaluating ideas for consideration Selecting team members Expressing support Providing evidence to justify the need for an idea</p>
<p><u>Communicating</u></p> <p>Communicating feedback Responding to feedback (communication) Sharing ideas with select users Notifying successful contributors</p>
<p><u>Learning</u></p> <p>Asking for help Responding to request for help Responding to a proposed idea which already exists Monitoring posts to find those needing help and responding Watching to learn</p>

Table 4.3. Generalised Mechanisms

4.5.2. Analysis of Dependences and Relationships between Affordances and Associated Mechanisms

As demonstrated in the previous sections, the individual affordance actualisations linked to one concrete outcome can be considered as building blocks which form different generative mechanisms leading to higher level organisational outcomes. In each instance the individual achieves a different outcome based on their goals, the selection of a material property to meet this goal and how they interact with the material property. The individual actualisation cannot be considered in isolation as it interrelates to the other building blocks. This section abstracts consistent relationship and dependences observed in the data.

One obvious dependency is of **sequential** nature where the potential of an affordance cannot be actualised before another affordance has been actualised and has produced a specific outcome. In other words the actualisation of one affordance is an entirely necessary condition and the dependence is absolute (Fig. 4.2.). For example, expressing support for an idea is not possible unless the idea has been posted. Similarly, providing advice (B) leading to learning must be preceded by actualised asking for help (A), passing feedback containing frustration (C) or proposing an idea which is already implemented (D). The sequential dependence is absolute in one direction and the affordances in each instance need to be actualised in sequence in order to deliver the value associated with the goal. Any one of the three options can lead to providing advice but it is not definite. At the start of using IG most contributors were posting ideas to create or modify products and services and therefore, the potential for providing help and advice on how to resolve an issue was not even there. With time users saw the potential for communicating and proactive learning and it was only then that other users saw the potential to help. This demonstrates the emergent and evolving nature of affordances and their relationship. The relationship between these learning affordances with time evolves to exhibit dependence in both directions. Providing help and advice will have a positive relationship with asking for help as it demonstrates actual value and potential to a help seeker and then the frequency and extent of actualisation of this affordance may grow. However in this direction, the dependence is not absolute as providing help is not necessary. In effect this type of relationship shows that both elements need to be there for the learning generative mechanism to be realised.

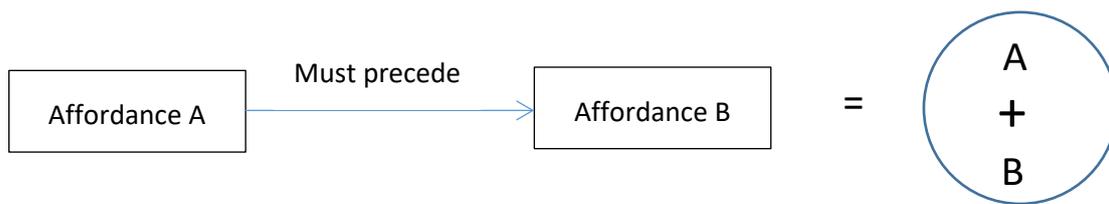


Figure 4.2. Sequential Relationship

Another one-directional type of relationship observed in the data is a **commensal relationship** where affordance or mechanism A benefits from the success of affordance B but affordance B neither benefits nor is harmed by A (Fig 4.3.). For example, viewing and searching relevant ideas in order to learn is positively although not absolutely dependent on tagging/categorising of ideas. A greater number of appropriately tagged messages improves the quality of viewing experience. Users can still actualise viewing of ideas which are not tagged but it requires greater resources as it is very time consuming. And tagging is not influenced at all by the extent of the viewing of ideas.

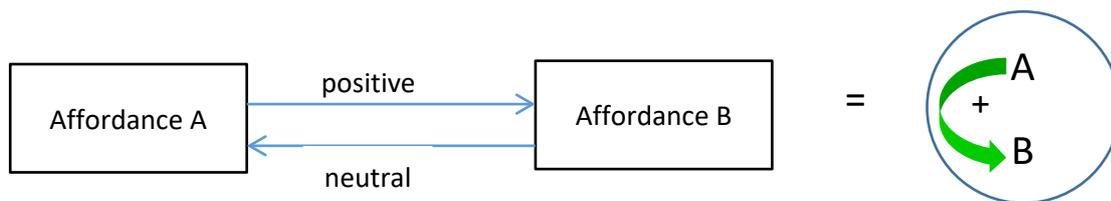


Figure 4.3. Commensal Relationship

“If I want to post something and it is already in the pipeline or raised by somebody else, knowing that is reliant on if I have issue let’s say with XX logon, it would be reliant on someone saying it is about XX. [Then] if I just clicked on XX I can see it all, but you can post something without any tags, again you’d have to trawl through.”...“I find that how people list them dictates how I look at. Don’t always have time to look through every one, look at the title, that sounds interesting I will go and have a look.”

An interaction, whether positive or negative, can be accelerated by the actualising of a third affordance. For example, viewing depends on tagging and the lack of categorisation can influence viewing. However, this can be compensated by the use of “share” feature.

“Sometimes we get an email through the share forum and sometimes we discuss the ideas through that. Sometimes we get alerts that there is something there. The word gets out and it helps if people get caught out in day to day stuff, not enough time to check it out and vote.”

An **inhibiting interaction** between two affordances occurs when the actualisation of affordance A negatively influences the actualisation of affordance B. It is negative in one direction and there is no effect in the other direction (Fig. 4.4.). One example is the way that reputation status is calculated and how it affects the selection of members of cross-unit working groups. The calculation of the reputation status does not take into account historic contributions. At the end of each year, contributions are archived and taken offline. Then all reputation coefficients are reset. If an employee has been very active the previous year and contributed the previous year, this activity would not be recognised the following year. This aspect of the actualisation can affect the success of selection of team members for working teams if a particular topic or area has not been discussed in the current year. For example, a member of staff may have been very active and contributed a lot of new ideas in the previous years and they may not have had the need or opportunity to contribute in the current period. Then they would not be identified as knowledgeable and active candidates for new working groups. This does not reflect the reality that most people gain reputation and knowledge over their complete tenure, not only the current year. Therefore, the determination of the reputation status has a one-direction negative impact on selecting development team members.

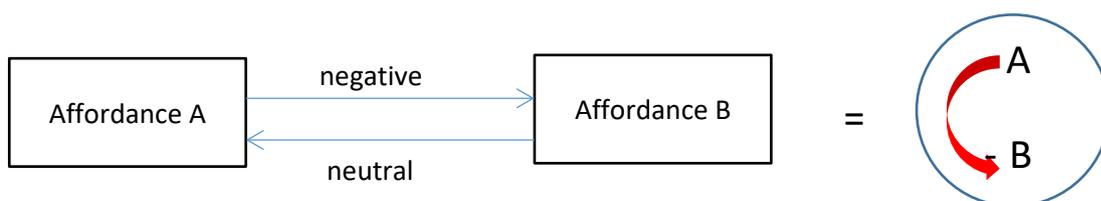


Figure 4.4. Inhibiting Relationship

Another type of a relationship is **mutualistic** when two or more interacting affordances benefit from their interaction. When one of them improves the other also improves which has a reciprocal positive impact (Fig. 4.5.). For example it has been reported that viewing other peoples’ ideas encourages creating more ideas and that in turn leads to more ideas to be viewed.

“I find that viewing others ideas hits a nerve with something else and encourages more ideas, encourages thinking of other ways of doing things and sharing.”

Another example of mutualistic relationship is created by the interaction of actioning/implementing of suggested ideas and the proposing of ideas. Improvement in implementing ideas supports improvement in posting new ideas.

“People who have posted when they see things are being actioned, they see value in it. When you respond to say something’s been fixed they come back and say it is great. They see an outcome from the back of what they have done and are encouraged to post more.”

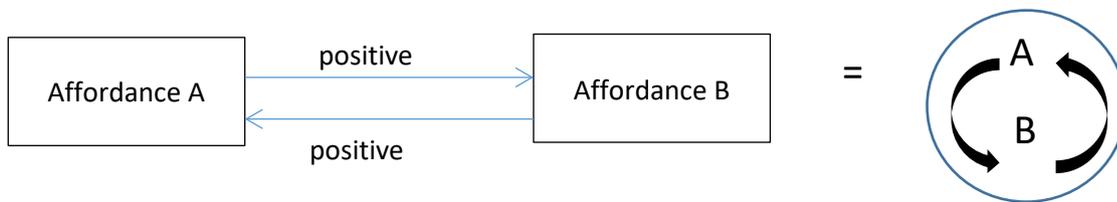


Figure 4.5. Mutualistic Relationship

All the relationships discussed so far have a positive impact at least in one direction. However, in some cases mechanisms can be in conflict (Fig. 4.6.). For example, the mechanisms of actioning and notifying are the responsibility of the same people, senior managers, and they are already under pressure. As a result the managers have given priority to auctioning as in their view that delivers the value to customers and the organisation. Effectively the actioning mechanism is in a **competing** relationship with the notifying affordance as they use the same human resource. Competing mechanisms use the same resource and this leads to tension and changes in both mechanisms.

“We don’t have communication right, issues of getting the info down the line. For some of the issues or suggestions posted, there has been a robust discussion and decisions at management level but it has not filtered so sometimes people are frustrated and post the same idea again or give up. “

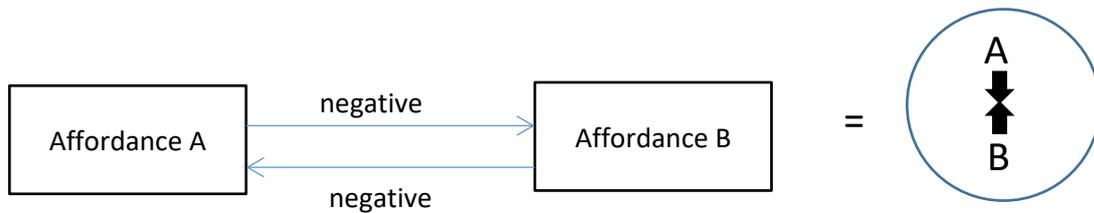


Figure 4.6. Competing Relationship

The previous example leads to another very important finding. Relationships are complex and not isolated in pairs and mechanisms can be influenced differently by different affordance actualisations. If affordance A and B are in a commensal relationship but affordance A is in a negative relationship with C, then C has a negative impact on B as well (Fig. 4.7.). For example, both senior management and front-line staff have reported that the reviewing and response practice influences staff engagement and contribution to the system. On the positive side, staff are aware that some ideas are reviewed as they see comments from senior managers and/or see ideas included in the yearly communication from the CIO outlining the approved ideas. However, there is a very high level of uncertainty in terms of what the process is, which specific ideas have been considered and approved. It is not clear to staff whether ideas get implemented at all. These weaknesses in the practice have discouraged some staff from contributing. As managers give priority to actioning, notifying suffers. Notifying is in a commensal relationship with proposing and as it suffers, this in turn affects actioning.

“if no one ever does anything with the ideas as well – ensuring its very visible – no one put ideas in if just putting ideas into this nice black hole.”

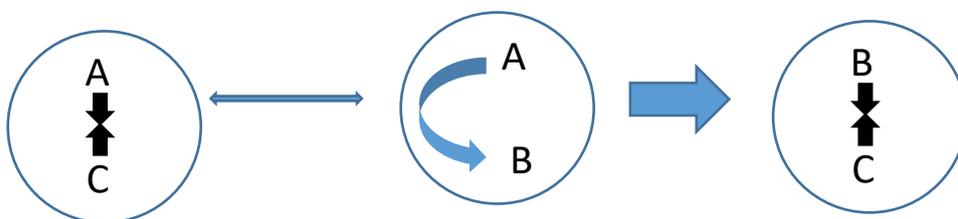


Figure 4.7. Complex Competing Relationship

Another complex relationship is between voting, selecting ideas and actioning. Currently selecting

is in a competing relationship with actioning and monitoring of ideas. The selecting of ideas is largely dependent on voting. However, this affordance actualisation does not have a positive impact on the quality of selecting of ideas and in turn it affects actioning. This shows that voting by itself does not support selection.

“As far as improving quality of ideas to go to the top. You look at the structure of our business, how many tellers we’ve got, must be hundreds of tellers who are not extremely high skilled personnel. So if you do it for majority rules, they think ideas great but if finance department trying to explain the capital valuation model it will be quite difficult to get across. So the voting only works if everybody understands what the implications are.”

Another example of a complex relationship including positive and negative interactions is that between searching, contributing and viewing. The messages are not organised according to themes but are listed in chronological order. There is no pre-set search mechanism to help find messages related to a particular topic, branch or person. Currently staff can add a topic as part of their post but there is no predetermined list of topics. Users can choose their own wording or they can choose not to include a topic. As a result the list of topics is very long and every topic has only one or two postings associated with it. There are many postings every day. Staff reported that they may not review posted ideas every day and when they log in they miss a lot of relevant posts. Some staff have demonstrated that they can’t even find ideas they have posted themselves. This demonstrates that the way searching is currently actualised is in a **competitive** relationship with viewing. This competitive situation is further aggravated by increased contribution and underactualising of the tagging affordance. The lack of visibility has led to many people posting ideas which have already been posted before. This in turn affects the commenting of staff as if they have seen this idea before, they do not comment. This consequently discourages the contributors and ultimately this has led to lack of contribution by some staff. These networked competitive interactions have led to an escalated downward cycle.

“If a lot of people put something on there today then things on Friday would be so far down they are not going to get looked at.”

“I think these things go in cycles. When it was first input people were really enthusiastic- some moved on- we need to do things to make sure it stays current.”

Many of the enacted affordances have interacted with associated existing organisational mechanisms and over time these interactions have led to significant changes in the original mechanism. Effectively the two processes (the actualised affordance and the organisational process) have merged and the original process has **mutated**.

One example of mutation is the way that the practice of providing suggestions and feedback from customers in the IG has interacted with the product development process. Prior to the introduction of IG, new products were developed in collaboration with one relevant department. For example if a new loan was set up, then Lending will propose and introduce it to the public. Then as customers gain experience with the product there may be some feedback on it and the department will make modifications to respond to it. There was no input on the specific product from customers prior to its introduction. Each product instance would be introduced and experienced in discrete periods of time and it has involved only staff from one department and limited number of customers who provide reactive feedback.

Idea Bank has afforded opportunities to expand the product development into a cross-unit and a cross-boundary collaborative mechanism. The practice has evolved to include staff and customer views and opinions prior to the introduction of a product. New products are now regularly tested with all staff through IG first. For example, a set of new ads would be loaded in the system for comments and suggestions first before releasing it to the general public. Gathering feedback has also been transferred from IG to the internet platform for communication with customers where they are allowed to test some products and provide feedback on the features. This demonstrates that not only the IG interactions have changed the process once but it has continuously evolved.

Another example of **mutation** is the change to the IT development and delivery process. Prior to IG, The IT staff were quite isolated from front-line staff and the primary driver for the introduction of IG was to provide a channel of communication with front line staff in order to gain feedback on existing IT tools and suggestions for new systems. They have been able to implement a lot of internet based tools and modifications to internal systems that they deemed “quick wins”. For example, they have changed how information is presented on the core system screen to make it easier for the tellers and to reduce the risk of disclosure of information. Suggestions for more significant system

developments that have been approved have been added to the IT road plan. Thus the generation and prioritisation of IT projects has changed from originating in the IT department to collaboration with all staff. Due to the improved communication and relationships with other staff, changes have been introduced to their development processes as well. There have been more prototype application developments to be viewed and tested by staff on IG and also, there are now members of the IT development teams who are not IT specialists in order to provide input.

4.6. Constraining and Enabling Conditions

IT value creation can be seen as interaction of material and social systems within an organisational ecosystem. The interaction of material properties and human agents actualises affordances. As discussed earlier, the specific actualisation is influenced by the purpose and abilities of the individual. Affordances then interact and form elements of generative mechanisms which operate and are influenced by other organisational properties and other mechanisms. This section reports on the constraining and enabling conditions within the organisation identified in the data (Fig. 4.8.). They are divided in two categories – user and organisation conditions.

Individual users actualise affordances based on the **goals** they have in interacting with the system. It influences how they perceive the potential for action in a material property and the value outcome of this action. This is demonstrated by the fact that the same technical feature has been utilised for very different purposes even when the individuals are aware of the intended purpose of the feature. For example, one user reported that she uses the posting of idea feature to pass complaints from customers:

“I usually forward customer comments to that IG – not sure if this is the right place, it is supposed to be for ideas – but I am sure it is about improving services to customers.”

This example also shows that the individual goals are informed by the perceived priorities within the organisation which in this example is stated as improvement of services. Therefore the **organisational goals and priorities** as shared by individuals also govern the interactions. This is further emphasised by users when they state that they are motivated to use IG as it *“makes you feel you are part of trying to make the whole bank better.”* There is no promotion or rewards associated with use of IG and therefore, the motivation in this case is based on the **perception of meaningful impact** that users perceive from their contribution. The perception of contribution is greatly

influenced by the **acknowledgement** of ideas and **updates** on implementations. For example, one of the front desk staff (A) reported that he had placed an idea but there was no feedback from management. He was relatively new to the organisation and was not aware of any ideas having been implemented:

“Don’t think I’ve seen what ideas have been implemented before- all I know is there is a system you put ideas on and then you like them or ignore them. That’s about as far as it goes.”

At the completion of the interview we went to a networked computer so that A could show me how he uses the system and we were assisted by another member of staff. In the process of searching for A’s original post, we saw several ideas which had been approved and when we found his idea, there were several comments added to it, many votes and a tick to show that the idea had been approved. A got really excited and said that *“now that I know that people look at it and something will be done, I will start using it again.”* The **recognition** of his contribution energised him and motivated him to continue contributing.

Interestingly, a few people commented that they would be happy to hear feedback even if the outcome was negative and it will not be implemented. *“Even if they said we can’t do that, be good to know.”* For these employees acknowledgement of the contribution and knowing that posts are reviewed is sufficient. Other users are uncomfortable with the public viewing and judgement of their ideas as supported by the IG. Those who are **less confident** have been reluctant to post public posts as they are not certain that the idea is good and what the reaction will be. They **fear** that the idea may **not be liked** or it already exists and it will lead embarrassment. As a result they may not post at all or they have shared their idea with the team leader and have asked her to post it.

“Some people do not like to share with all, they think it is big brother thing. A lot of the ideas already exist and when they post it, we tell them that you can already do it (so some people may be embarrassed if it is public). They cannot be anonymous.”

“Some people are a bit scared they feel their idea might not be as good.”

However, most people reported that if they would not post a public post, they would post a private idea which goes only to senior management as they are very familiar with senior managers and feel very comfortable talking to them. This **culture of open communication and engagement** with senior

management ensures that everyone has an avenue to post their suggestions.

“The exec team are close to staff. We have a night in each branch, take staff to dinner and talk to them to find out what is going on at grass roots level, what’s driving you nuts...”

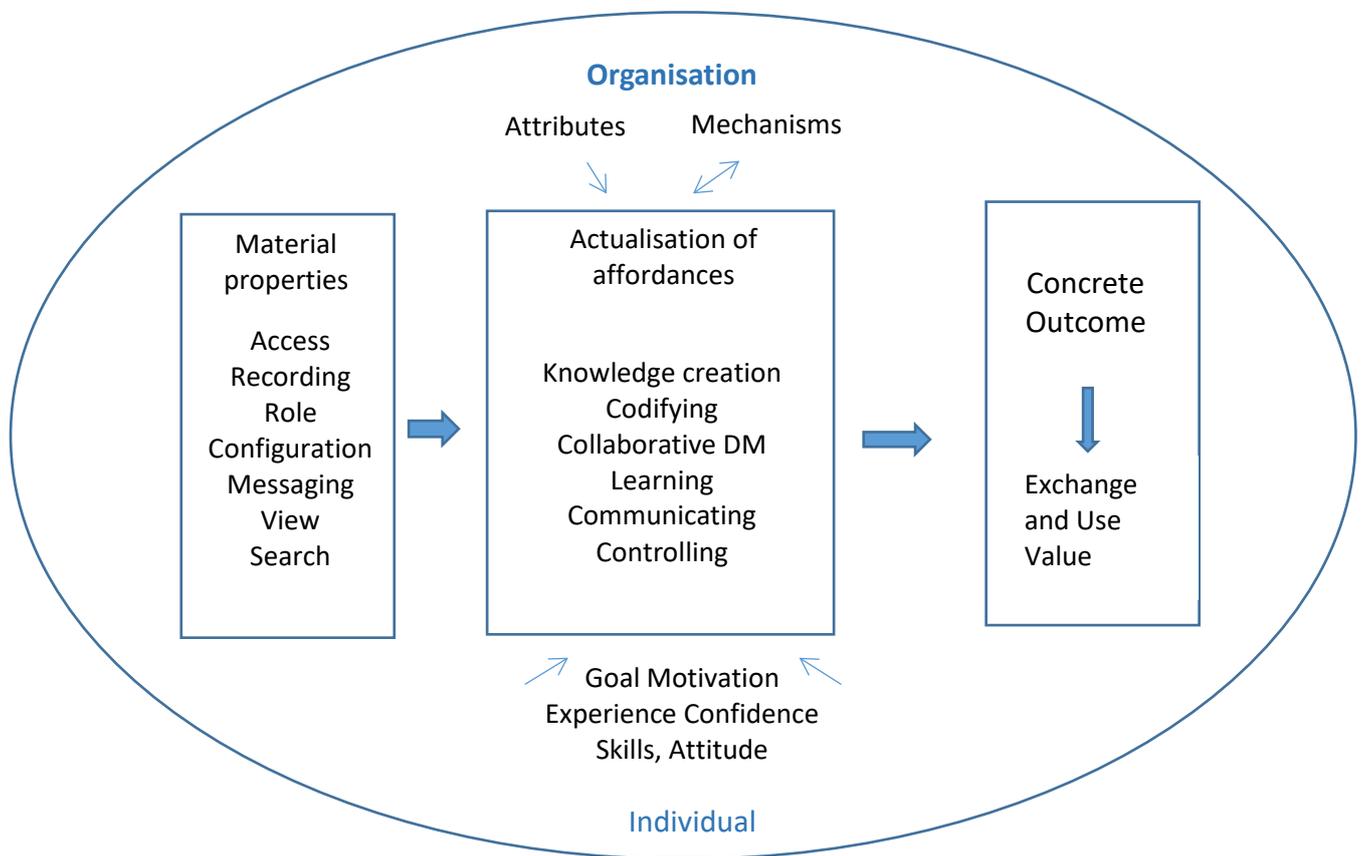


Figure 4.8. Value Creation at Bank2

As previously discussed, a number of users have posted ideas for services and tools that already exist. When I reviewed the responses where there was an explanation where to find the information, several other users admitted that they were **not aware** of the existence of the tool either. Therefore, knowledge and awareness of existing services has an effect on what people contribute. This is aggravated by the fact that the knowledge base on the intranet is not structured so that it can be easily structured and it is hard for people to find information. This is also relevant for the unintended actualisation of asking for help as if people can find information on the intranet, they would not need to ask through IG and IG can be used as intended.

“And sometimes there are posts about features to internet banking that we already have in the pipeline but if you are new to the bank you don’t know so you would post ideas and suggestions. That is very hard because we don’t have a good search functionality.”

Finally, even though all executive staff expressed full support and enthusiasm for the IG system, at the time of the study (three years after implementation) there is no dedicated resource to monitor the ideas and ensure that they are forwarded to the relevant heads of units. Initially the system was planned to provide a feature which showed the status of an idea, i.e. whether it has been reviewed, decisions on implementation, timeframe etc. The expectation was that there will be only a few ideas posted, the CIO will review and redirect then to the relevant heads. However, the use of the system was well above expectations and the executive team was not prepared for the additional workload. Both the CIO and the Operations Manager reported that they were “overwhelmed” by how many people use the system and how they use it. The senior team are considering the assignment of a role as part of the digital support team. The role is currently under consideration as part of a strategic change review, which aims to change some of the roles in the bank. This shows that as the system gets used, it leads to change in roles and practices in the bank. It also demonstrates the importance of resource allocation to support the functioning of the system.

4.7 Summary

This chapter presents the results from the case study of a collaborative knowledge creation system IG in Bank2. The study identifies the value outcomes from the interaction between the human agents and the system’s material properties, candidate and actualised affordances, the interplay and dependence between affordances and mechanisms and the influence of structural and individual enabling factors. The system was developed in-house to allow access to and contributions from all staff in the bank. Originally the intention was to provide a forum for staff to propose ideas for improvements in technology support and services but after discussions within the senior management team the scope was expanded to allow for any suggestions and ideas on products and services. The system allowed more than one person to work and contribute to a proposed idea and allowed staff to express approval by voting. All interactions with the system are completely voluntary and there were no expectations or suggestions that staff needed to access it at all unless they need to. Therefore, the design was based on the assumption that the system would be used irregularly and there would not be many contributions. However, access for viewing and

contribution exceeded expectations and a number of unintended affordance actualisations occurred, which produced intended and unintended value outcomes.

The IG system, originally, was intended to produce new or improved products and services. There was no process of activating the collective intelligence of staff to create new knowledge so there were no preconceived routines and no target users. The enthusiastic response of ideas of improved services and new products for different customer segments realised the desired outcomes of significant improvements and introduction of new products, which led to exchange value for the customers. Many of the suggestions led to changes in internal processes and structures, which indirectly added value to customers as well. In addition, the unintended use of the IG as a knowledge-sharing platform has led to learning and human capital outcomes such as company-specific knowledge at the individual level and subsequently to consistency and standardisation at the organisational level. Individual users posting suggestions or questions receive help and advice, which improves their knowledge of existing products and services and ensures that customers receive correct advice and that internal processes are performed consistently. Posting of suggestions has also encourages others to reflect on the status quo and come up with their own ideas which has improved innovation capability at the individual and organisational level. Another value outcome is the relationship and social capital achieved by connecting people in similar positions. As the bank is distributed across the country, many users have reported that the introduction of the IG allowed them to discover other staff in similar positions and become acquainted with them and give them the ability to communicate directly. Others have found that the IG has provided them with a sense of community and has increased interaction both online and offline.

Analysis of the relationship between the individual users and the IG system and the concrete outcomes of interactions resulted in identification of a number of single affordances. Each actualisation led to a concrete outcome but the overall value outcome can be derived and enabled by different affordances. At the basic level the IG provided the users with the potential to access and record information. However, the ways that these affordances were actualised varied depending on how the users perceived the organisational goals of the IG system, how these goals aligned with their individual goals and the potential they perceived in the material properties to meet these goals. For example, recording a question and posting an idea for a new product utilise

the same material property but the users have different individual goals. Reviewing the individual affordances, some of them were first grouped into main types. Then based on the similarity of the functional outcomes and the nature of the individual affordances, all affordances were abstracted into higher-level mechanisms of knowledge creation, collaborative decision making, communicating and learning.

Actualising the affordances that enabled the knowledge creation mechanism contributed new knowledge to a product or service concept. This includes affordances where the user initiates and records a complete idea, posts a partial idea or contributes additions to an existing post. The collaborative decision making mechanism includes affordances that allow the user to participate and contribute to the final approval decision. The knowledge creation mechanism produces a proposed concept but the collaborative decision making mechanism leads to an approved (or rejected) complete concept. There was a great variety in the actualisations of the affordances, as some of them were not originally envisaged in the design of the IG. In some cases users used the commenting sections to provide rationale and justifications, others simply offered support by voting or posting a positive comment. The use of votes evolved in using the individual status points to identify champions and product development team members. As the IG was perceived as a communication and knowledge-sharing platform, affordances enabling the communicating mechanism led to sharing existing knowledge and information. As the material properties were not designed with this purpose, users saw potential in the posting feature to provide their feedback on existing products instead of contributing ideas and this initiated interactions with other users. Also, as there were no properties designed to provide feedback from decisions makers, they used the comments section in an unexpected way to communicate decisions and progress. Finally, users saw the potential of the IG in connecting them to a collective body of knowledge represented by all other users. A number of affordances allowed them to query users on existing knowledge and get help in particular situations. These affordances, which provided the users with the ability to learn and improve their company-specific knowledge, formed the learning mechanism.

The formations of affordances that represent the mechanisms incorporate chains of single affordances, which are actualised differently. They interact with other affordances or mechanisms. Analysis of the dependences of affordances in this case identified that the interplay between mechanisms can be positive or negative, one-directional or mutual. These interactions are dynamic,

not discrete. They can evolve over time. Positive relationships identified include sequential, commensal and mutualistic relationships. In these relationships the interaction of the mechanisms benefits at least one of them and does not harm the other. Inhibiting relationships harm one of the paired affordances while the other one is not affected. Finally, a bidirectional competing relationship was identified where both of the affordances rely on the same limited resource and their relationship is mutually harmful. These paired relationships further interact with other affordances or pairs forming complex interactions, which aggravate or mitigate the effect of one affordance on another. Finally, over time, these relationships can lead to long-term changes to one or both of the mechanisms as they evolve and mutate.

In addition to other mechanisms, this case identified other constraining and enabling conditions for actualisations. At the micro level, the enabling conditions included individual goals, self-confidence, prior knowledge and motivation. The individual goals affected how individuals perceived the potential of material properties and how they actualised the affordances to achieve these goals. Low self-confidence was reported as constraining condition, which inhibited users to post publically as they were not sure that their ideas were good or appropriate. In this case context lack of prior knowledge had an enabling effect for actualisations of affordances associated with the learning mechanism. Individual motivational factors related to intrinsic motivation as the use of the IG system was completely voluntary, there were no expectations to use it and there were no rewards associated with it. Therefore, individual users were positively motivated by their perception of the meaningful impact they will make to the organisation, the recognition and acknowledgement of colleagues and senior management. However, some users feared that they would be shamed and embarrassed by negative comments or others “not liking their idea”. This fear of disapproval had a constraining effect on the actualisation of the affordances related to learning and knowledge creation.

At the macro level, the organisation culture and structure, clear organisational goals shared by all created enabling conditions for affordance actualisation. The culture of openness and transparency and the flat structure create a trusting environment where individual users believed that they all had a say and will be heard. It eliminated any fear of repercussions if they had critical comments and feedback, which enabled the unintended actualisations of posting feedback instead of new ideas. All respondents discussed the organisational goals and their agreement and alignment as a

further enabling factor to contribute their ideas. The IT infrastructure and knowledge structure had serious limitations in supporting users to find relevant knowledge required to support clients. This in fact led to and enabled unintended actualisations associated with the learning mechanism. However, the lack of resources is a serious constraining condition on providing feedback and making decisions. This in turn discouraged further contribution.

Chapter 5 Process-based KM System at Bank1

5.1. Organisational Background

Bank1 is one of the largest banks in Australia and New Zealand (NZ), it operates in 33 countries in the world and it is in the top 20 banks in the world. The bank employs over 9000 staff in its branches and offices and it holds 30% of the home loan market. It was established in the early 19th century and has grown through several acquisitions and mergers. It owns several subsidiaries and provides a full range of financial services to retail, business and rural customers. The business division caters for small businesses and large institutions. Ten years ago, it merged with another major NZ bank and all the operations and systems of the two banks had to be consolidated. In NZ, Bank1 has a single NZ head office and operates fairly independently of its Australian parent. It has four main divisions – retail, commercial and rural, institutional and investment. The system studied, in this case, is used by the commercial and institutional divisions of Bank1. The Information Technology (IT) manager is not part of the senior executive team but the chief operating officer oversees that portfolio. The organisational structure is centralised with branch and regional officers reporting to the head office.

Bank1 is listed on the share market and in its strategy it aims to balance the investment in long-term improvements to customer services with the need to generate good returns to shareholders. Bank1 is committed to above-peer earnings growth through capital and expense discipline and productivity improvements. According to their strategic documents this can be achieved by sharing common technologies and processes and in NZ this started with a transformation program in 2013, which included a review of processes and the introduction of integrated IT. The operations strategy for the operations and technology functions included focus on stronger control environment, lower unit costs, better quality and lower risk. It also targeted alignment between business, operations, support and technology.

“We’re trying to simplify the business. I keep saying to people it’s the why you look for, why are we doing what we do? We want to be the best bank in NZ, the only way to be the best bank in NZ is to have the good simple business that goes with it.”

This case concerns a collaborative system for approval of lending to commercial customers, which in this case will be called electronic lending system (ELS). It has been implemented for three years in the organisation and there has been sufficient time for users to get used to it and for values to be realised. It is only used in the institutional commercial division that serves business customers. The introduction of the system is part of a long-term plan to integrate technology and streamline processes. This strategy was further supported by a merger, with another major bank, in 2003. At that point it was important to be able to see all customer data in one system but some of it would be in the system of one bank and some of it in another.

“One of the biggest issues we had was we did not have a way, one place to see everything, customer information, different types of facilities the client has, accounts etc. When we amalgamated these things together the idea was to take the best of both systems and ways of doing things.”

As stated in the mission and strategy of the organisation, technology plays an important role in supporting the organisational goals. The IT strategy is led by the business strategy and the IT team do not have input in the business direction. The IT team is located in a different city from the headquarters and they receive input through the chief operating officer. For the system development, there were several project teams which were led by IT project managers and each team had an expert representative to explain what was needed from the system from the business/user perspective and what staff needed as support for their role. In interviews there was very little awareness of what the IT team does and a perception that any requests for system modifications are ignored.

As a first stage, a customer database was developed which allowed a single customer view (SCV) and provides the basis for future IT projects. This was very successful and staff was very positive about the fact that data is integrated in one source and is always up to date in the SCV. The second stage was the ELS, which used some of the data from SCV but also integrated a process of lending approval and its requirements.

This system is constrained to the credit management of business customers. In the first steps of the process, the relationship managers (RMs) negotiate the terms and conditions of lending including

securities and covenants. The RMs have a direct relationship with their business customers; they regularly review the credits and respond to queries and requests for advice and changes. The clients are allocated to the RMs based on their current load and are not necessarily in the same geographical region. The associates support the RMs and sometimes communicate with clients to request information or provide clarifications on communications. RMs have the discretion to negotiate loans up to a certain amount and also to approve reviews based on conditions. When the conditions are not met or the amount for the loan is above the discretionary threshold, the senior managers need to approve it. All lending documentation and conditions need to be approved by the senior managers. In some cases there are two or three levels of senior managers who need to approve decisions and documentation. In addition to financial data, RMs need to provide their assessment of risk, personal notes on the customer and their justification for the decisions on credit limits and conditions. Very often the senior managers will request for further clarifications and explanations and sometimes they will request specific changes. If, during a regular review, the customer does not meet certain conditions that have been negotiated or their financial situation has been adversely affected, they are advised and supported by risk managers who also negotiate new terms and conditions.

Prior to the introduction of the ELS, all participants used Word and Excel documents which were not shared. These documents were printed out and faxed or couriered to senior managers and risk managers. The notes would be handwritten on the hard copies, further documents would be attached, and then the bundle of new documents would be sent to the next person who participates in the decision. This pile of papers *“up to an inch thick would be physically moving around”*. Various versions of documents will be circulated and sometimes the most up-to-date version would not be the one that was used to draw up the final contract. In addition to the physical documents there were sometimes email exchanges between senior managers, business managers and associates that were often printed out and attached to the file. Sometimes there were phone conversations on what needs to be done and if in the process the business manager is sick or leaves and someone picks up his job, *“they will be none the wiser and have to start all over again”*.

During the development of the ELS a review of practices in different areas and departments revealed that there were many different ways in which RMs performed the same processes. In the context of the lending process, some managers would ask for different securities covenants, and they would

have different ways to assess the risk. As a result, there were significant variations in how well documented and justified decisions were, the conditions that would be attached to the same type of credit and the time that it took to provide service to customers. The review discovered over 40 different templates that managers were using. A team reviewed all the templates and met with focus groups to identify best practices.

The ELS has pre-set templates with headings and sections prompting the user to fill in the correct information. Some of the sections are purely factual and require financial and historical information on the customer, and the industry risk factors and codes. However, some of the sections require the RMs to present their assessment of the situation and justifications of their recommendations. The justifications are based not only on their assessment of the risk based on the information received but also on personal knowledge of the customer and their circumstances. There is a high degree of judgement in making and justifying a credit decision and these freeform sections need to be presented to support a proposed decision.

“You can certainly come up with different decisions for the same customer even the process can’t change that. If somebody has made up their mind, they are going to lend the money; they find a way and fill the boxes accordingly.”

There are also sections for the senior managers to add comments and request clarifications and changes. These notes are saved in a log that is part of the history of the document. Also, the system acts more as a customer relationship system as RMs record separate notes when they have had any communication with the customer, including phone conversations and meetings. A lending document is a living document and changes can be made and logged until the final decision is made. Then the document is locked and nobody can make changes. Everyone in the bank has access to current and past documents unless they are deemed particularly sensitive.

When the ELS was first introduced there were significant issues with stability and subsequent loss of information and completed work. The ELS would frequently crash and data would not be saved. Occasionally, users would press save and assume that their contribution has been recorded but in fact it had not been saved. The system has many sections with free text for users to include notes, explanations, reasoning and their recommendations. These sections with free text would

sometimes change display over time and make them hard to read. These issues caused reluctance to use the system at the beginning and lack of trust in it. In that initial period, the use of ELS was “phased in” and it was not compulsory. Actions were taken on the feedback given to the IT department and improvements were made and within a few months of its first introduction the system started operating reliably. Three years after its introduction all managers involved in lending approval are using it. The use of ELS is now compulsory and credit cannot be approved without it. They have reported benefits and value to the organisation, shareholders and customers.

5.2. Value Outcomes

One of the original goals of the organisation was to reduce costs and streamline processes. In support the ELS system delivered value in the form of efficiency, **time and costs savings** for employees and customers. Prior to the introduction of ELS the lending approval was performed using hard copies of documents which had to be signed off. The fact that participants (managers, lawyers and customers) were very often in different locations meant that there was a lot of physical transfer of documents and copies of different contracts and notes.

“So with any credit approval or review there is a chain of command; and what would happen is it would physically be printed off, faxed off, couriered off to the credit department. And so it is physical bits of paper, up to an inch thick - physically moving round. Copies kept as well, and also off it went to this person, takes time for things to arrive and so forth. It was messy and then there might be an email trail of 3 or 4 discussions, since the original document, not necessarily attached to it physically and so on, quite a nightmare. We have places like Invercargill, Whangarei, New Plymouth where it would physically take them a couple of days for the physical document to arrive in the credit department. Now it is instant.”

In ELS there is shared access and all additional notes are added and recorded instantaneously. It has led to elimination of duplicate documents, which can be interpreted as reducing printing and storage **costs**. It also reduces the risk of missing information as notes are added to different copies of documents and it creates the possibility that one party may not have the full set of notes. There is no need to fax and courier documents, which also saves courier costs which can be substantial and recognised as “money wasted”.

The **direct time saving** from the elimination of transfer and holdover has led to a great **improvement in customer service** by delivering information and decisions more promptly. The relationship managers and senior managers viewed this improvement as a **necessary competitive response** to “customer pressures”. One of the business managers states that “it used to be that a week to give a client an answer was satisfactory; now they want 24 hours...the competition out there, we have to keep up with it”. Another manager stated that “it is a different world and there is continuing evolution”. Therefore, this value to customers also improves the competitiveness of the bank.

The recorded complete history of clients, which can be accessed by everyone, ensures that **relationship with customers** is improved by **meeting their expectations** and that everyone in the bank knows about their history of interactions. Otherwise, they may have to start fresh when communicating with a manager they have not met before.

“You are not going in blind, if he’s visiting an oyster farmer tomorrow, and knows - he has a list of who he is going out with the relationship manager to meet, he can do his homework and be skilled up on the client before he even comes out. Customers presumption, from my 28 years in this place is that we know everything about them, they automatically presume because they bank with us for x amount of years we should know everything about them... you can be far more professional and knowledgeable talking to them, rather than ‘I need to check that out and come back to you’ which makes you look like you don’t know anything.”

This recorded history also allows for increased knowledge reuse. Credit reviews are completed every year and a lot of the required information is repeated. With the ELS holding the records from previous years and all recommended changes, sections of the previous review can be copied and others can be updated accordingly. This leads to both – **saving time**, as there is no need for duplicating in information input, and also ensuring that all the relevant information is included (**completeness**).

“We can copy the memorandum and make changes we need that has been a huge one. If a customer has the same facilities every year, nothing changes – we can copy their last [credit document] and

hit the button and say bring in latest financials, and make 3 or 4 changes and it's gone. It's gone, it's a huge one rather than rewriting the whole thing again. That is one of the big ones."

The central shared access also facilitates internal audit processes. Prior to the introduction of ELS *"audit teams would have to come, sit there with the files, read everything, do their assessment. All their costs of being with us for 2 weeks come back on the business"*. After the introduction of the ELS, auditors are able to access all files electronically and save travel and accommodation **costs**.

The ELS is a workflow system and has automated electronic communication incorporated which **saves time** and makes it easier to monitor progress. As soon as a staff member completes their part, an instruction and a message is sent to the next level. For example, previously when a loan is approved, a RM had to fill out a separate document, forward it to the legal team and instruct them to proceed with drawing up a contract. All of these steps are now eliminated which not only saves a lot of work but also reduces the risk of inaccuracies through misinterpretation. As there can be many versions of documents through negotiations with the client, sometimes the terms set in a contract are not based on the latest agreement.

"That's now gone - don't need to do it, the note goes to the team and says go to this application and all the information is in there. They can do it all off that living breathing document. No room for misinterpretation, which can happen quite a lot. When you are dealing with one document instead of a document with all these additions, you update the physical document to reflect what needs to be done so the end result is what has been negotiated or discussed with the client rather than that was it – on this paper on top it changed to this – we didn't know that – gets rid of that ambiguity."

Another **efficiency** has been achieved by the elimination of communication and compiling of information through the shared access and direct input of some of the data.

"Let's say there is 200 relationship managers – that's an email to 200 people so am I to collate it, with an Excel spread sheet as all the rest, as information comes back in, in the hope the relationship manager will complete it as they have conflicting priorities. So now they can actually do all this work and then ask specific questions they need a huge efficiency. A lot less of who's got this, who's got that."

Standardisation of practices was one of the main goals and an outcome achieved in different ways. Senior managers reported that the system allowed the assurance of consistent standard practices which reduced inefficiencies and most importantly, risks of making the wrong decisions or presenting the wrong versions of the documents to the customer. Also, it allowed more transparency on how decisions were made and the ability to comply with reporting requirements imposed by external bodies. For example, an extensive review of practice showed that relationship and risk managers were using *“a huge amount of covenants”, “so many different covenants, wordings, and interpretations”*. This was caused by the freedom given to RMs to negotiate with clients.

“The bank would say we want a covenant – the wording should be – the customers at the top end of the business would take it to their legal team and say no, we don’t like the way that’s worded, we want it worded it this way. They would come back to the – relationship manager and our lawyers would say we don’t like that – all it was doing was building this big business where all the legal teams on both teams are spending time, effort and money and it was just what I call a waste of time and waste of effort for what the end result was meant to be.”

This led, not only to a lot of time and money spent, but also the wording of the covenants may not be correct and could be challenged by the client as it is open to interpretation. In such cases *“if a covenant wasn’t worded clearly enough then it would pretty much become null and void or the lawyers would have the argument - it is not a real covenant or that was not meant by the client and you’re telling us that we’ve breached a covenant but we haven’t breached a covenant.”* This introduced a great financial risk.

At the completion of the review, a set number of covenants with standard legal wording were included in the ELS for communication to the customer and inclusion in contracts. The standardisation of some of the legal conditions had led to reuse of a limited number of conditions, which **saves time and money** for negotiation of the wording. This time saving according to the RMs means they have more time to interact with customer and *“do the real job”*. It has also led to clarity of the requirements and subsequently **reduced risk** to the bank.

“The impact is customer – more tuned to customer – what the covenants are, it is more clear around the wording from the bank’s point of view to protect the bank when we do have to go and call this up and this is why. Got rid of all that legal issue we used to have a lot money was spent by the clients and ourselves on lawyers sorting out how the covenant will be worded. Now pretty much go this is what it is – move on. It’s either in there as this or not at all. Not mucking round with it.”

Efficiencies have been achieved not only from elimination of unnecessary tasks but also from better distribution of the workload and more optimal use of human resource. If a loan application is submitted at any time and the RM at that branch cannot take it as his load is already too high, then the application can be picked up by a RM at any location in the country and worked on until completion. Effectively the way the distributed teams work has completely changed from a set of isolated teams to one team with geographically distributed members. This reduces the stress on any one unit and improves **the response time** for the customer.

Another benefit of this new way of operation was stated as improved **flexibility** and **business continuity**. Flexibility refers to the ability to work anywhere anytime. In addition to the better distribution of resources mentioned earlier, this flexibility allows staff to deal with customer queries faster when they are travelling and to work from home.

“I get calls and emails on my blackberry so I don’t have to go back to the office and physically pull that file out – read it, make and see what’s going on I can be on the move anywhere and do that. I can be – in Invercargill reading my emails and the file is in Highbrook and go on line and read them, talk to the client”

This flexibility also allows changes in who is involved in dealing with customers, if for any reason, the case develops and there is someone better to deal with the particular situation. So it is not only a flexibility in terms of load distribution, space and time but also flexibility in terms of the ability to transfer cases to match expertise.

“The value of portability as I described before is making decisions quickly, at the right levels at the right time – not only that, for example, here’s a really good one – we just done a bit of a swap round

of our portfolios, I moved my guys round slightly to take on different customers so it's actually the value of portability is it actually gives you flexibility that is how I see it."

Business continuity refers to the ability of the organisation to continue with normal operations even if they are faced with a disruption ranging from a member staff being on leave to a natural disaster preventing access to physical space.

"If you are on holiday, on leave and somebody sends you an ELS, somebody else can pick it up and read it and approve it or do whatever they want whereas in the past it can sit on your desk."

In the case of covering for an employee on leave, the organisation can easily redistribute the load and continue seamlessly with customer service. The alternative in this case would have been a limited interruption of business and delays in customer response. However, in a disaster situation, such as a fire or earthquake, the alternative is more extreme as access to paper files and physical space is completely lost and potentially the bank can lose customers and not be able to function at all. This was the case with the earthquake in Christchurch and many of the interviewees referred to the potential enormity of the consequence to the bank and customers if they had not implemented the ELS.

"I'll give you a really good example of BCP[business continuity planning]. The first earthquake that went through in September, which was in the weekend, my guys were up and running on the Monday even though we weren't in the building, we were talking to customers and we knew what deals we had on the go, we could look into our work queues. Had they been working on it originally on the – way we did it originally nobody could have – for example we had a manager who had an issue with his property, we had his assistant to pick up the deal and continue the deal working on it. Previously if that had been the case, he would have saved it on to his platform, his computer – in his file, sitting solely on his hard drive, not on the server. Which meant that the customer themselves might have been disadvantaged. So we found that a real advantage. The thing I found about it was, had we been operating in the previous environment we wouldn't have got deals done."

"Had we not had [ELS] we would not be in the position we are in today - we would have been significantly disadvantaged through these earthquakes"

Following the earthquakes, the Christchurch branch has turned completely paperless which was initially forced on them by the circumstances but then "normalised" and they believe to be the only place in NZ and Australia to operate in a completely paperless mode. This has allowed them to not only fully utilise the storage and access functions of the ELS but also has saved them a lot of storage space for the paper files. This was a **cost saved** to the organisation but also in a situation of limited business space available at the time, it was also a way to **continue to operate**.

"We haven't been back in the building since February - the reality is we have no files - the only place in the country, dare I say it in Australia as well that doesn't have customer files. They are all electronic. I mean in the previous regime, pre-earthquake - you would never have 90 people in this building; everyone would have filing cabinets. We had a central filing system, a whole room dedicated to files. Every other building has a central filing system - we don't."

The integration of ELS with the core customer database and the incorporated rules to highlight potential errors has led to increased accuracy of the data to be reported and **improved accuracy** of the grading **decision** for the customer. Previously if information was not recorded an incorrect grading may have been given to a customer which in turn leads to *"the bank is undercapitalised which is a big no-no, or putting aside too much capital which means our return to shareholders is tied up."* Therefore, the accuracy of incorporated information and inconsistency highlighting lead to risk reduction and gave a better outcome for shareholders.

The ELS has also changed the control flow and the structure of the process and this has improved the accuracy and the compliance of the agreements. Prior to the introduction, two people were involved in the decision – the relationship manager and the credit manager. It was easier to miss important information when only one person prepares the draft and agreements would progress without important conditions.

"Now we have involvement for parts of it, like the decision making and then there is another independent involvement for that. [ELS] drives segregation of duties and so it drives us to be accurate at the front ...because it's actually going through more hands."

The design of the templates to request specific comments and information has ensured completeness of information provided by all participants. As each section specifies what is expected to be included it ensures that there are no missing elements required for the decision.

“We now have this what’s called documenting credit risk, which tells the preferable way - the considerations for each of these text boxes. There is an improvement or commonality in how people are doing it. In the past they would write it in a different way, or I might put it in this bit of text over here, someone else put it somewhere else, it just – succinctly sets out everything that is important.”

The electronic access has also led to better monitoring and control which has reduced errors in many areas ultimately leading not only to reduced risk but cost savings. For example, if mistakes are made in the categorisation of a company, they would be allocated different capital requirements and this can lead to costs for the client or for the bank.

“Cost capital application is such a big issue for us – where to keep an eye on how much of our lending book for the group is investment nature, commercial investment, how much is commercial development? Two really important things - they attract a high level of cost capital versus what is owner occupied. Now the cost capital for that is different. So we regularly now monitor basically on the ansic codes available, who has got what lending for each RM – send out “is that actually correct or not?” and review and assess from a distance. That is now monitored, our cross capital savings were - I can’t remember how many million it was – just purely from seeing that information quickly, clearly.”

ELS has incorporated rules and checks on what information and documents are required at each step. If they are not included, it highlights it and it becomes clear to the user that they have not completed the step correctly. This has led to **completeness of information**, which in turn **improves decisions and reduces risk**.

“One of the things that [ELS] has done - because all the processes that accumulate in [ELS] - you now actually know where you have an error and when you know you have an error you have a risk, and you correct that. But before my interpretation might have been different to your interpretation - now it’s all the same. So from that way we’ve actually de-risked some of our issues. Very much so.”

The use of a single integrated system has also streamlined the training not only in the system but also in the lending process as it is incorporated in the system. This has been perceived to have led to time saving, improved quality of service delivery and reduced risk of human error.

“The other point I was going to make - it is far easier to train a bunch a staff of one system, than train a bunch staff on 4 systems and allows you then to say this is the way we want you to write this document, or document your credit. All of a sudden you de-risk that part as well. A delivery and also a risk element to it.”

Shared access was consistently stated in terms of providing **increased learning capacity** for the organisation and improved individual expertise. As all documents are available to everyone, business managers reported that they searched the documents to find previous cases within a particular industry if they have just started working with a new client. This gave them insights into the requirements of this particular industry.

“We’ve gone to look at a certain industry and who’s involved in it, then talked to them or looked at their notes. The impact is - you are smarter, have more knowledge and you share the wealth of knowledge that this place has. And that’s really important.”

Junior associates stated that they proactively searched for documents created by their immediate superiors to better understand their expectations in terms of preparing the documents. They also mentioned that they would ask about examples of really good case documents so that they “can learn from the best”. A former training manager mentioned how much easier it is to train new staff now as they have compulsory training in the system and through that they also learn about the processes.

The permanent record of revision requests was mentioned by most interviewees, but for different reasons. A business manager or a senior manager can request changes and revisions. Those are recorded in the system and become part of the final document. Junior associates saw positive value of this information as they could judge which business managers “are really good at writing the documents” if there were not many requests for revisions. Another associate mentioned that she uses the revisions requests from her previous cases to remind herself of some potential mistakes.

In both cases the recording of the history improves the understanding of what is required, i.e. the **human capital** of individuals and ultimately the **quality** of the credit proposal.

One of the senior managers stated that he collaborates with the sales team within the organisation and they used his documents to identify what other products or services they can offer to his customers. This relates directly to capture of exchange value at organisational level. It demonstrates how the interaction of a human input with a separable input can create new value. Collaboration was discussed by most of the other interviewees as they mentioned that now that their processes were aligned with the terms and requirements of other units, they found it easier to collaborate. Also, the access to all documents allowed them to identify individuals that they can call if they need help in a particular situation.

5.3 The KM System: Material Properties and Basic Affordances

The main goal of the KM system was to incorporate best practices for credit lending from the two merged financial institutions in order to ensure standard processes across the organisation. When the system was introduced there were a series of training sessions on how to use the system and what is required in terms of information and knowledge input in different sections. There were also public discussions on the expected benefits of standardisation.

The priority for the design was to ensure that all required steps of the process were included and it complied with the internal and external regulations. It is a process-based KM system and the features support application of knowledge by setting best practices and workflows; knowledge sharing by allowing automatic electronic messaging between team members and access to all information by staff; building organisational memory and firm-specific knowledge by recording history (table 5.1.).

At the basic level the system allows users to **access, configure user roles, search, review, record information, and send messages** to specific individuals.

All users can access and review existing credit lending cases unless they have been marked as “black boxes”. ELS allows all staff to access any document created within the Credit Memorandum module. This access is view only which prevents any unauthorised changes being made. Their purpose in

reviewing may vary but they can all review the factual and expert judgement information added to the notes. They can also view the thread of communication between participants including the date of the contributions.

All staff have access to the ELS but this access is restricted according to their authority. The creator/maintainer of the document is automatically given full rights i.e. the ability to add, edit and delete sections of the document. Then the originator can configure user roles for any other participants. The authority is determined by their position or by the specific authority level set by the originator of the individual lending process. Relational, risk, senior and general managers can approve proposed credit features up to their approval authority. All managers can request revisions and direct the flow of the process through the lending lifecycle. Therefore, the basic affordances vary for different roles and for different lending cases. For some users their user role will determine the authority of access for all cases but other users will have different authority within individual cases depending on their involvement.

System users can search for specific documents they wish to review. Users are required to define which settings will be applied so that when they access the Document Search screen they only see documents that are relevant. They can search by industry code, branch, originator, approver, individual customer code or by the document approval status. These search settings allow users to tailor their viewing of documentation. When the document has been defined as a 'Black Box Deal', only those staff that have been given access as a document assignee will be able to view the document. The document will be hidden from view for all other staff. If an ELS user that is not an assignee performs a search on a document denoted as a 'Black Box Deal', no search results (matching documents) will be returned.

All staff who participate in the lending approval process in any capacity can create new documents to add to existing case folders or to create new document templates. Within the Credit Memorandum module there are various document templates for documenting annual reviews, and new lending and diary notes for each of the business units. Most of the document templates for each business unit will contain the same sections or document components. When the originator creates the document they can also record who the other direct participants are so that they can have editing access right to parts of the document. Any additions by the participants in the decision

making are being automatically recorded. All changes to the document are captured in the History log and there is the ability to further restrict who can view documents (if required) through functionality known as 'Black Box'. Originators can also create new customers and record information about the customer without adding further lending documentation. All approved participants can add information to existing templates. Therefore, irrespective of their purpose in adding to the case document, all users can record information.

<u>Material feature</u>	<u>Description</u>
Accessing ELS	It allows all members of the organisation to access features of ELS available for their user role (maintainer vs reviewer). Access is only through the bank intranet and authentication is automatic without further log in.
Creating documents	It allows users to select a pre-set template and create a new document of this type.
Contribution to existing document	Allows staff included as editors/decision makers to add to the already created templates in the parts assigned to them.
Set user preferences	Allows staff to customise default search options and notifications.
Document search	Allows staff to search for a document by date, industry, customer, region, branch or contributors.
Share	Once a document is completed, the original creator can select users who can access it and it becomes available. By default completed documents are available to all staff.
Share incomplete document for a decision	When a non-decision contributor creates a document then they can send the document for review, recommendation or approval.
Email notification	It allows the user to set up an email notification when a document is complete, requires approval, requires rework or/and when it is approved.
Record a decision	Depending on their decision making authority, users can recommend credit for approval, approve, request changes or deny.
Save	It allows a user to save changes to a document. All saved changes including comments are recorded and time stamped.
Hold	It allows an authorised user to put an incomplete document on hold
Withdraw	It allows an authorised user to withdraw an incomplete document

Table 5.1 Technical Features of ELS and their Purpose

The sending messages affordance allows users to exchange messages with other authorised users

or to receive automated messages from the ELS. In order to progress a document through the different lifecycle stages (e.g. from in progress through to under review), the authorised participants can direct who needs to review their contribution. RMs can propose a new customer or a new element of a credit agreement. Then the system allows them to forward the notification of the completed work to the next person in the chain of approval. Users can select options to specify what message is sent to the next user requesting approval, sending for review, sending a recommendation, requesting clarification on parts of the document, or approving or denying a request for approval.

The ELS system is an enterprise-wide system which includes a number of features ensuring that only authorised users can use some of the features. The use of ELS is mandatory for all staff participating in the credit lending decision making process. However, all free text features and some of the elements of a customer document portfolio provide a great degree of flexibility and users can choose whether and how to actualise the basic affordances. The system has been designed from the perspective of the credit management team and the decision making and recording affordances are fairly fixed to meet their requirements. However, the data showed that some users have actualised affordances in unexpected ways addressing goals that were not in the original design. Also, in this case there were deliberate variations of actualisations of well understood affordances. The following section will consider concrete outcomes and the interactions of users and material properties which produce these outcomes to identify actualised affordances.

5.4. Retroduction: Identification of Actualised Affordances

ELS was designed to support the credit management team and the main organisational goal was to ensure accuracy, and reduced risk and compliance in the credit processes and decisions. The overall outcome for the organisation is reduced number of defaults, well serviced loans and audit compliance. However, the way the affordances have been actualised have led to improved customer service, customer and institutional knowledge. These outcomes have been realised at the organisational level. This section outlines immediate concrete outcomes resulting from the interaction with the ELS and identifies the actualised affordances based on retroduction from these outcomes (table 5.2.).

5.4.1. Actualised Affordances Associated with the Creation of a Credit Agreement

In line with the main objective to support the credit approval process, a number of immediate concrete outcomes relate to the development of a loan agreement with customers. To achieve an approved loan agreement, there are several concrete outcomes that need to be present and not always forming the same composition. This is dependent on the complexity of the loan structure and the knowledge and understanding of the participants. For example, a number of separate security notes, facility agreements and terms may be required which will be ultimately elements of the final agreement. Also, there may be several recorded drafts of the agreement until they are finally approved. Another possibility is that the new agreement is a modification of an existing agreement (e.g. increasing the lending). Although there will be a great variability in the specific purposes of the documents, the immediate concrete outcomes associated with the creation of the loan agreement are an approved loan agreement, draft agreement or an element of an agreement such as a single security condition.

A RM creates a new lending agreement document by selecting a template and a customer from the system. This automatically inputs some parts of the agreement such as the client's background information and the standard requirements for the type of document created.

"We just have to say 'this client' and it sucks up all this information and it's hooked up to a whole lot of different systems. That alone saves a lot of time of having to write it all or add bits of information to it, and allows you to change the information in front of you to reflect new valuations, you can change the system to show the new valuation looks like."

At this stage, many respondents reported an unintended affordance actualisation. As stated above, the system allows the users to change information in case they have further input. The assumption is that the underlying information about the customer fed from the other systems is correct. However, *most people talk about some of the information dragging through from other systems isn't quite correct*", which has led to users actualising a **correcting** affordance. This involves checking the information and correcting inconsistencies. This corrects only the data in the ELS and *"it does not affect the original data"*.

Some of the data in the ELS in the standard boxes cannot be corrected. The intended action in this case would be to communicate to other units supporting the systems holding the incorrect data. However, the RMs see that as an extra load and they have actualised the correcting affordance by adding the correct information in other sections. However, then there is a mismatch between the document sections and they need to explain why their version is correct.

“If that has not been done right, there is a lot of work [that] has to go in to get that right and bring it back to [ELS], and if you can’t do that in a hurry and trying to get approvals, you have to write extra explanations of why that doesn’t line up.”

The system also checks what the authority level of the creator is and the risk level of the case, then suggests what other roles will be required for the decision making based on the specific context (authority level and the loan amount). The RM then needs to select a team of participants who match the requirements. The immediate concrete outcome in this is the assignment of the **decision making team** to the case and their notification. Any of the assigned team member can reassign the case to someone else if the proposed credit is above their allowed discretion or their workload is too high.

“What we do is put them into a matrix and come up with a number system, 1-10 in fact but depending on where it sits the level of discretion changes – so depends on where it sits in one sense, but how well secure it is in the other sense, and that triggers who signs the deal off. “

Once the document is created, the RM writes a draft of an agreement proposing all elements of the agreement and their justifications based on the customer background and how the RM has assessed the loan risk. The system has standard wordings for some of the elements that the creator needs to **select** based on the context. This ensures legal compliance and standardisation for parts of the agreement. It is still up to the document author to select the right options and then they need to type up their analysis and justification in freeform sections. This will include *“25-30 pages proposal... including the purpose, detailed assessment of the company, the industry, its management, the systems it has... analysis into the ways the bank can get its money back.”* Then they submit the draft to the rest of the team for their input and/or approval. This is one way that **the document creation** affordance is actualised but several variations were reported. *“The credit managers experience a*

wide range of quality on how people put these together.” Although the system sets standard sections required for each document, there is no explicit guidance as to what needs to be in the open-ended sections.

“There is various boxes that you need to fill in, okay and with headings but there are headings or boxes where it is freeform, where you can just type why we are doing it or this is particular elements about the property.” “When you have a free format and in a hurry to cut down, you hope they don’t ask many questions style rather than more thorough and think it through.”

The lack of explicit structure and guidance incorporated in the ELS has led to interpretation both by the main contributors and the approvers. There is a shared understanding that the main contributor needs to provide evidence in terms of financial information and their rationale for proposing different terms and conditions. However, there is great variability in the expectation of what an acceptable rationale is and what reasoning and information need to be provided.

“Not every credit manager is the same, they are going to like to focus on different things. So one person might be on the management and the business structure and strategy, whereas another is just on facts and figures and numbers...I guess it is working to your credit manager’s style.”

The lack of specific guidelines and automated checks also means that some RMs are not clear which sections need to be completed and enter “N/A” in required sections. Interpretation applies not only in terms of the content and the level of detail but also in the layout and how the details are presented. The varying interpretations and preferences have led to a significant amount of rework by the RMs to suit the requirements of an individual senior manager.

“We have quick one page templates that specify the critical things that definitely need to be in there, but every credit manager that’s going to approve it has a slightly different view on what they think it all means. So I’ve had the case where I’ve put a credit memorandum to one of the managers that’s gone through – no problems, no questions, straightforward. I’ve put through pretty much the equivalent to another manager and they’ve come back and said - no we want you to change these boxes and put the information in this order - and you can waste a day just doing stuff that does not add to the decision making.”

Many of the respondents reported a variation in how they enter the information in the ELS document. The ELS allows users to only type in text which is not formatted or spellchecked. The layout of the information is very important for some to present their argument and some credit managers are also requiring further information which is best presented in tables. Triggered by the need to present information in different formats such as tables and the lack of features supporting this need, RMs are first entering the text in Word or Excel and then they copy and paste into the ELS.

“You can’t really put tables in and it’s got no capacity to spellcheck and when it inputs financial statements, it puts them in such a way that you can’t interpret from those numbers of good or bad. I end up copying and pasting from spreadsheets or my own tables. You could just not rely on what is in there - to me it doesn’t present a good story for the reader to understand what is going on.”

Another reason for this variation is that sometimes when the document is saved, it changes the format or rearranges the information which effectively creates more work. This is further aggravated by intermittent saving issues and system crashes leading to loss of work. So some RMs are also keeping word files separately as a backup in case they need to copy and paste them back.

“Nobody knows why but sometimes you work for an hour and decide to save and it might not save – learned by habit to double check that it is saved and formatted correctly. We do this a lot - we copy and paste and import from our documents.”

When the proposed draft agreement is submitted to the team, the RM actualises **a request for input** or approval. The senior members are notified and the request is added to their queue. As they have several requests on the queue at any time, they actualise **the prioritising of the requests** differently. Some of them deal with requests on first come first serve basis:

“Generally my first view of the ELS documentation is when it comes to me for either comment or sign off. For me that’s when it gets assigned to me, the only reason I know it’s assigned to me is I get an email that comes in, and it actually tells me who assigned it to me and has a link and I click on it, and I open up the document. What I then do is I’ll go through and I’ll check it, read the document and get

an understanding of it.”

Others prioritise them based on their assessment of the effort required to clear it (least effort first). *“it comes in my queue, I can make that decision if I want to look at it then or look at it later – Often what I do is look and click but leave it till later, if not time to read through it, if it’s one file note to see if I can approve this, say I can do that five seconds, go through yes, click and approve it, that’s it. Full credit memorandum, I need to spend some time on that and I can prioritise that where it runs and sit on my queue.”*

5.4.2. Actualisations associated with decision making

In many cases the senior managers **request further work** such as additional information, clarifications, corrections or changes to the loan conditions. Periodically there is a review of the requests for reworks and more than 10 different categories of issues have been identified from missing and incorrect information to unclear reasoning and contradictions. The senior manager enters the changes and clarifications requirements and they are logged in the system. Then the RM is notified that there is a request for rework.

“One of my facilities people sent me a list saying please complete.”

“They always come back with questions and commentary but that can even be different amongst the different credit managers given their experiences.”

In some cases, senior managers have reported that they do not record the request for rework if the request is not structured or they’re serious issues. Instead, they prefer to meet with the RM and discuss it to ensure that they have agreed on the required changes.

“I read through it and then I either go back and make request or get out of my chair and talk to someone - I don’t use the ELS document and say deferred, I generally leave it on my queue, and I will go and say I need to talk this through with you.”

“For example the other day I had a credit come to me, and it didn’t make sense, and I went back to the manager and said I don’t understand and they’d sent it off to the credit team as well – I sat down and said, these are the areas I’m not comfortable with, I can’t get my head around – and we sat

down and he explained it to me, and that's just not written in the credit - just like anything you know – so what he does is he'll just go and withdraw me from the credit, rewrite and resubmit it again."

When there has been offline communication to request rework, various approaches have been used to ensure that the conversation is documented. In some cases, the senior manager would record a request for rework as intended and based on the conversation, they know how to ask for it and that the RM will know what is expected. So there is an element of tacit knowledge which is not being recorded.

"Quite often what we do for an audit trail is - we have a discussion, go round the table and say what we have to improve and then the credit people say I will send you back a reply for rework so they detail what we've agreed [in the ELS]."

In other cases the outcome of the conversation is recorded by the RM in the form of a log of changes to the original document or in cases where there are too many issues, they withdraw the original submission and create a new one based on the feedback. Therefore, in these cases **the request for change** is not actualised through the system at all, only the affordance of making a change is actualised.

"[when the SM request additional conditions] the RM can go back to his credit memorandum, rework it and change it to reflect this new condition, and save it and then you can see it has been done. So when it goes off to the next person who touches the file, instructs, it's clear what they are."

5.4.3. Actualised affordances associated with the use of prior cases

Reworking is a serious issue for bank processes as it delays the decision and leads to additional communication and work. To avoid reworking, many RMs and associates have used the ELS in an unexpected way to support the original document creation. They use the system as a repository of prior knowledge and experience to provide them with good exemplars as to how they should write the document for a particular type of client and for a particular senior manager who will be reviewing and approving the document.

"That's the brilliant thing about it with ELS is that it will capture archive – keeps everything and I can

go to any RM or customer in the bank and read about them which is a good way to see how different people write, just teaches you different ways as well, because not every credit manager's the same; they're going to like, focus on different things."

This interaction with the ELS **to search for incorporated knowledge** is in some cases proactive. The RMs do it voluntarily, prior to writing a document, in order to be better prepared about the requirements for this credit manager and for the customer context. The releasing condition to actualise this searching and learning affordance will be the assignment of a new case manager, type of customer where they are not as experienced. In other cases the releasing condition is a suggestion from a superior to read a particular exemplar and the learning is more directed.

"How to know if it is a good one or it's a bad one – yeah and I guess there's people around our floor that you know if they're strong credit writers you could read them or people go, 'Oh, blah, blah, blah – wrote a really good CM. You should have a read.'"

And from the perspective of the senior managers this is a way to advise and help their staff: *"I have a manager struggling with writing up his credit memorandums - he's just not hitting the mark I need. The easier thing I can say is there's a really good credit memorandum sitting on ELS here's the link to it, go and have a read of it, because that's actually a really good one that you could copy off if you wanted to."*

Even experienced RMs, habitually, search and access prior cases when they have a new client who is in an industry that they do not have experience with. In this case, the prior memoranda are not accessed as exemplars of how to present the information but to learn more about the industry and its inherent risk factors. Then they consider these factors in their analysis and tailor the discussion based on this historical knowledge.

"It's a great resource. If I was lending to a say – quite a complex manufacturing business, I can go and search by industry code and find other businesses like it, how they are structured...and feed that into what I am doing."

The credit managers have also actualised this use of prior knowledge but with the purpose of

instructing the RMs what are the specific contextual factors they need to discuss. *“We had a case recently- a large bakery so the credit manager said these are a couple of others you need to look at to make sure your CM covers the key areas. Not sure how widely people use that but it is a really good business tool rather than being a process credit approval tool.”*

There was a significant degree of variability in the actualisation of this affordance as this use of the ELS was unintended and some staff were not aware of the potential to use prior documents. Also, some reported that they would not trust the quality of a prior document if it has not been recommended.

A variation of the proactive search for knowledge was reported by associates when there are more than one co-authors. When one author submits a part but there is another more senior RM who submits the document, then there is not always feedback to one of the authors. Sometimes the other author would highlight and comment on parts that need to be changed but in other situations they will modify the text and submit it. When there is no feedback, some associates have accessed the finished document when it is approved (releasing condition) and have read through it to learn how their original submission was changed. This is not common practice as it is not required or directed.

“Probably self responsibility of going in and reading it. If I could write it and just say, ‘Susan, it’s done,’ - send an email - have no contact – send out an email and then she’d fix it up, if it needs to be fixed up and then me - once it’s been approved or sent to credit and going in and reading it, some people might not do that – I usually, you just read it in the way it’s written, I might go, ‘Yeah, I didn’t think to say ---.’”

5.4.4. Actualised affordances associated with the preparation of the final agreement

When all requested changes have been completed, the author submits the new version of a document for approval again. The team member with approval discretion **reviews the document** and checks that all requested changes have been made as there is a log of all changes which they access.

“You can tell what they’ve changed, from my point of view – I re-read it and understand, it does log

it and tell you. It doesn't get lost whereas before you could have ripped it up and start again."

If the changes are satisfactory, the senior manager approves the document in the system and articulates any conditions or further comments. The concrete outcome of this stage is the finished approved internal document and then the RM instructs a service manager from the Facilities unit to transfer all conditions into a legal contract for the customer.

"I said to the credit manager it's approved but...you need to make sure this is...I want a new valuation done as part of the conditions...or there is – all the conditions are in one place, you know what they are...so the covenants in one place, all the information around the length of lending, the interest rate, what it's for, are entity, security, that is all in that one place. So that's recorded in the history for ever."

The service manager has full reading access to the ELS and from the log they can see what changes have been made to the original submission and which conditions have been updated. They prepare the agreements to be signed by the client and use the ELS document to ensure that all approved conditions are included. The transfer of all conditions is not automatic and it is up to the service manager to ensure that they have entered all the correct information in the customer document. Both the service and the RMs have reported issues with this step and have identified absent affordances which affect the quality of the outcome and the efficiency of the process.

The assumption is that once there is an approved credit memorandum, the contract will have all the correct information. However, the transfer is not automatic and there are **variations** in how the service managers interact with the ELS to find the right information to enter into a facility (actualisation of retrieving information from ELS). The credit documents in ELS are multi-layered and include links, tabs and attachments. However, most service managers use a printout of the document which does not include the information on links or in attachments and this leads to missing information. All respondents attributed this issue to a **missing affordance of automatic transfer** of data from the ELS to the facilities system.

"What we would like is...not filling out pages of instructions for the CRS team to do the work. We just – send them a note saying go to this credit memorandum number; everyone that's done is tagged – there it is."

“We spend a lot of time typing stuff up and making sure that we’ve inserted all the information that we can think of and some of that is not transferred into a facility agreement.”

“They are looking at the [ELS] document which is the incomplete document and typing into the facility from there... Some of them will actually go into ELS – not just look at the printed document but will actually open up the facility tab where I have written various comments and put it into the facility agreement which is good but if they are not a proactive person they are going to miss it... [For example], I will write this is supposed to be applicable on this date etc and that will not be printed on the hard copy, you’ll have to go into the system and into the facilities tab to find this comment.”

From the facilities point of view, the issue is that while all documents are standardised in terms of content, they are not standardised in terms of their presentation and the relevant information will be dispersed across many pages and they need to search for it. Also, they consider a lot of the information included in the credit document extraneous for their purposes. They find it easier to refer to a printed document rather than have two screens open. This variation of printing the credit document instead of accessing it electronically has led to the emergence of unintended replicating and validating affordances actualised by the RMs. Some of the RMs have reported that they use parts of the freeform sections to prepare a separate section for the service managers. This section includes the same information that is already stated in other parts of the document but it is prepared specifically to reduce the risk of missing or inaccurate information in the final document.

“It is at the point now that I label one of the boxes at the beginning ‘facility structure’ where I now write in a table all the facilities and pricing – exactly how it is, so that is pure double up- a complete double up and it does not save us any time but I know I have checked it and it’s quite easy to check.”

A variation of the converting of an approved agreement into a contract occurs when the service managers start working on the contract before the agreement is approved. They have access to the ELS drafts and sometimes they start working on a document which is still in progress or requires approval. This is normally done by request of the RM assigned to the case. In this situation, the service manager first accesses the draft credit document and creates a corresponding draft contract.

Then when the document is approved, the service manager accesses the history log and checks all the changes made after the date of the draft creation and incorporates these changes.

"I do normally get it right at the end, but sometimes when we are taking new customers on board and they've put it, 'Still in progress,' they can say, 'Can you start working off - we're still wanting approval.' I'll only do a draft and until I can see that it's completed approval, I'm not going to send the documents out, so it helps me track each progress of that and what other changes have been made. I can always go into history and see what were the changes made after, so I don't have to start from the beginning. So I can say, 'Okay, I've done all these - these were the changes made,' and then I can incorporate it, so it's very transparent."

RMs have reported that they now have added a step to the process and use the ELS after they receive the finished document. They are using the system **to validate** the finished document and check for errors.

"Essentially, the relationship team are charged with checking every single detail...but when you write 'Please do this' you pretty much expect it to be done and many times it is not. I pretty much never stop checking. I keep checking on things."

5.4.5. Actualised affordances associated with customer relationship management

All current commitments to customers are reviewed annually. The immediate concrete outcome is an annual review document which is created and saved in the ELS. In some cases the review includes changes or additions to the terms of agreement and sometimes it only includes updates on the customer situation and the RM's analysis of how loan is being serviced. With long term customers who are fairly consistent in their performance there is a great degree of repetition from year to year. Even when there are changes, the review would refer to past reviews. Users have seen the potential for reuse and have accessed and referred to the prior reviews to ensure that what was agreed has been completed and to include continuing measures.

"Every year when you go to do the new review, you can just pick up what you had last year and transfer across to this year and then make your alterations."

The ELS is used to record not only commitments to clients in the form of loan agreements, but also any discussions that take place with the client (diary notes) and actions that a manager has taken in relation to that client. The information is recorded for future reference and there is no approval process. The releasing condition is an interaction with the customer or a follow up action. As clients may speak to different bank employees the purpose of this recording is to ensure that everybody will have access to up to date customer information. The immediate concrete outcome of this **recording** affordance actualisation is codified customer knowledge. There is a degree of variability as this is an unintended and therefore voluntary actualisation of an affordance and *“if people are not prompted or think there is no point in putting this in the ELS as this is on the relationship, not the credit side.”* Many of the respondents have emphasised the importance of actualising this affordance as they consider all interactions relevant to know what the customer situation is, both in terms of the specific credit situation but also in terms of their personal interests. Some of the RMs and senior managers use this information to decide what events would be most appropriate for a customer to be invited to.

“The compulsory is credit memorandum, any formal commitment to the client – or the client(s) has made to you – not compulsory using it as a customer relationship tool. I personally put it in there because I guess I run the mentality you need to store that information so other people can access it, if I got hit by a bus.”

The ELS was created to ensure that the credit practice complies with the organisational policies and with the international requirements. This was done through incorporation of the mandatory elements in the document templates and through the requirement of input and approvals at different levels. The templates and the complete logs of all activities have been used extensively to support internal and external auditing. External auditors receive authority to access all credit documents and to review all the information they require in one place.

“That’s recorded in the history for ever. I come along and pick up the file to review as an auditor I can go what’s happened about this valuation, it’s been done – of course it has, or no it hasn’t? It allows us to make sure we monitor it.”

“They [external auditors] can sit where ever suits – whether it be Melbourne, Auckland – they can

go and read these documents, make their selections, do their assessment of whether we are making the grade or not or do their work without spending weeks with us.”

The wealth of customer knowledge codified in the ELS has presented potential to some of the staff to use the system as a customer management system both recording and accessing customer information. All bank staff are allowed reading access to the knowledge and some of the general managers and RMs are using it to access the codified customer knowledge and their history with the bank in order to prepare prior to interaction with a customer. The release condition is a scheduled meeting or a talk with a client. This is particularly useful if the manager has not had previous interactions with the customer which is not uncommon due to the distributed nature of the service and staff turnover. The purpose of using the ELS in this case is to prepare for a meeting with a particular customer and the immediate concrete outcome of the interaction with the ELS is customer knowledge at the individual level.

“If it’s a general manager going out for first – that’s the other big benefit we are finding, general managers’ come out and go visit specific customers or get a phone call that’s a complaint from the client – they can go in and open one of these and read about the client – so either they are prepared before they go out - or alternatively they can get a feeling of what this client is like from a credit or a banking perspective.”

“We have a situation with the relationship manager who is on leave at the moment – away sick and there’s certain customers sending emails and the rest – now I noticed before I left I don’t know anything about this client, and I dived in and read the last credit memorandum around what’s going on. So when I rang him, never dealt with this client before, I have some basic knowledge around what they do, what they’re up to, what’s going on. I cut off everything at the pass or ask professional questions, rather than how was your holiday and what was your weather like. You know – it’s about the business itself of - I understand we gave you some money for more working capital because you had stock that was x amount arriving from this country [that] didn’t arrive on time.”

Relationship and general managers have searched for existing expertise when talking to potential clients as well. They have used the ELS to search for existing knowledge on existing customers within the same industry, with similar risk factors or securities. This helps them to prepare for initial talks

in order to advise the customer what would be the bank's expectations and how they can improve their position. Again, the search can be proactive or directed by someone else in the bank.

"I've got a potential client coming to talk to me in South Auckland about poultry farming out of the blue - I don't have anyone in my book involved in anyone in this industry - I can go into the system and see what clients in the commercial area, are poultry farmer's, which manager manages these customers and then I have the ability to talk to that manager directly or go in and read his credit memorandums under that customer to see what's important about this client, what things should I be looking at and so forth."

"I've had phone calls from people that have said I have a client who wants to buy some seafood quota - what do I do? My answer is talk to this guy here because as you can see he banks x, x, x, and x [is] heavily involved in this industry. A lot of knowledge sharing around that."

5.4.6. Actualised affordances associated with monitoring and control

Senior managers have discovered the potential of the ELS to **monitor individual and group performance** due to its logging and recording features. As all drafts are saved in the system and can be accessed by everyone, it is easy to check on progress of documents and where the holdup is. Managers have used this to view drafts and see how much progress has been made to ensure timely delivery to the client. This applies both to the development of credit documents and annual reviews. Some of the managers use it simply to check and remind their staff but others have used this to plan and distribute the load.

"So I also run the team that spend their time writing those reviews and making sure they are done in a timely manner. So I am in the system all day long seeing who's doing it, who's writing or if they've written, and where it's at. Monitoring I do as well for that, it's important."

"One of the things I do is we review all of our customers every year, 12 monthly basis you can prepare one of these documents before you go out and see the client. We need to do them every 12 months and I pick up a manager's portfolio, get a report that shows me all the reviews that need to be done in the next 2-3 months and I try and get my team to work 60 days ahead, so I can go into their queue

and look to see if they have those documents ready to go, so for me it's quite a good management tool. They haven't – if not started and I can go and see what is the story. Certain parts of the document they can start and without submitting – you can hold it in the system, other parts you can you don't need to start - cool from that point of view. Which I could never have done before. I can go 30 or 60 days ahead and say I see you haven't started the ELS on this thing, is there a problem? You are ahead of the game so from my point of view it's actually worked well."

The communication logs and the version history has also been used to monitor performance in terms of quality of delivery. Senior managers are using information on how many requests for rework a staff member has when they review performance. In some cases they have rated the feedback and requests for rework in categories and have kept statistics on which categories of rework individuals have. Some of the categories are considered to be due to carelessness and others due to lack of understanding. Then this information is used to tailor the mentoring approaches for individuals. ELS is also used to provide objective information in terms of codified communication, versions of proposals and feedback if there is a dispute between a RM and their credit manager. When an employee then reports the issue to a senior manager, they can see if the problem is in the quality of work, miscommunication or differences in personal style. This judgement can then be used to correct the right issue rather than having to side with one of the people involved.

"I can have a manager who is struggling, [with] the quality of the documentation they are putting up - I can go back and click on all of their ELSs and the replies they have had from the credit manager, I can read – no manipulation because in ELS every reply you can't wipe one off one you didn't like, it logs it and tell you when it was done, a great audit trail to it I guess, I can see – if there's been a difficult ELS I can see the backwards and forwards, reworks that happened and why I will send it back and say, they put subject to it or whatever, the more reworks I see I know I have a problem with one of the managers or a problem could be a personality issue; got one of those going on right now."

As mentioned before, the financial information related to a customer or industry is fed automatically to the ELS from a core system. As there have been numerous reports that the information is not always accurate and it takes some time to request corrections reactively, staff are dedicating time to access the ELS remotely and check that industry codes and other information on clients is correct. They do this regularly and proactively so that there fewer issues with the system. When industry

codes are incorrect, this also leads to different capital requirements and correcting this information has not only made the service more accurate and timely but also has saved the bank money.

“So we regularly now monitor basically on the [industry] codes available who has got what lending for each RM – send out - that actually correct or not and review and assess from a distance. That is now monitored, our cross capital savings were - I can’t remember how many million it was – just purely from seeing that information quickly, clearly”

This affordance is not consistently actualised as some staff assume that the information is correct.

“some guys will look at the big picture yeah that’s fine and assume everything’s correct – others will say go through that and check these, I don’t always check ANSIC codes other than quick level look over – other guys will pay a lot of attention to it.”

<u>Immediate concrete outcome</u>	<u>Action to actualise an affordance</u>	<u>Goal directing the action</u>
Proposed agreement or element of it	A RM generates a new document selecting a type and team members. Any of the participants reassigns the case to a different team member. RM and RAs complete parts of the document. RM requests input and approval.	To propose a credit agreement
Recorded feedback on proposed document	CM and SM record feedback and specific requests for change.	To stipulate conditions for approval and compliance
Approved credit document	CM and SM evaluate proposed documents. CM and SM enter additional conditions. CM and SM record approval in the system.	To finalise the agreement. To ensure compliance
Final contract	Some RMs enter separate instructions for service managers. Service managers review the terms from ELS and enter them into a standard contract. Service managers review drafts of agreements from ELS and start a draft contract. Service managers review approved terms and update draft contracts.	To create a legal document based on the approved credit terms

	Service managers print the ELS document (partial) and use that to create a contract.	
Improved knowledge of credit document requirements	RAs and RMs search, view and use elements of previous documents specific to a credit manager or a type of industry. CM and SM search and view prior documents to provide exemplars.	To learn To improve performance
Customer review or other customer communication	A RM or RA create a non-decision document to record updates and interactions with a customer.	To codify customer interactions to support distributed service
Improved knowledge and understanding of customers and industries	Searching and viewing documents associated with a specific customer or industry by all staff.	To learn To provide personalised and improved customer service
Status information on planned documents	A CM or SM searches for annual reviews for customers and views logs to check on progress.	To ensure timely delivery To plan loads To manage performance
Understanding of performance issues	Senior managers monitor and view communication and history logs to understand and resolve a performance issue Senior managers record reasons for rework for individuals and monitor stats	To understand issues based on objective information
Audit report	Auditors access all documents associated with commitments to customers.	To ensure compliance
Correct information in core systems	Checking factual information which is automatically input in the ELS from other systems. Correcting of information in the ELS. Communicating inaccuracies.	To save capital To improve quality of work

Table 5.2. Actualisation of Affordances

5.5. Analysis of Affordances and Associated Mechanisms

5.5.1. Grouping and Abstracting Affordances into Higher Level Mechanisms

The first group of affordances was abstracted from the main functional outcomes of a new credit agreement or the new terms of an existing agreement. The enabling and releasing conditions were similar as all of these affordances needed the specific client request or interaction as a trigger and were enabled by the structures and conditions to allow decisions on the specific client. All of the micro affordances contributed and were elements of a **collaborative decision making** mechanism as all functional outcomes were forming parts of the decision and every participant in actualising the affordances expects others to contribute to the decision.

Making decisions on credit agreements involves multiple participants at different levels. In some cases the participants are in different locations forming virtual teams. Even when all decision makers are from the same branch, they perform all tasks online. This requires coordination of duties and work and a group of affordances actualised to ensure that the right people are doing the right task form the **coordinating mechanism**. All of these affordances are of the same type, assigning a task to a person and the work conditions relate to the availability of resources.

The affordances including processes of ensuring the correct performance of the process were abstracted to a governance mechanism. The outcome is correct input or output of the process and the enabling conditions are rules and standards of operation. The configuring affordance was originally intended and incorporated in the design of the ELS. The rest of the affordances in this group were necessitated by the unexpected variability in the inputs (e.g. incorrect input data, incomplete or inaccurate information). [See table 5.3]

<p><u>Basic functional affordances</u></p> <p>Accessing global and historical information Setting up templates and teams Recording information</p>
<p><u>Knowledge transfer</u></p> <p>Proposing terms Recording conversations and interactions Recording outcomes of offline team discussions Reviewing customer knowledge Reusing prior knowledge</p>
<p><u>Collaborative decision making</u></p> <p>Presenting rationale and evidence Evaluating proposed documents Approving documents Including additional conditions Requesting rework</p>
<p><u>Coordinating work</u></p> <p>Requesting input and approval Writing instructions for service managers Prioritising requests Re-assigning documents Monitoring loads</p>
<p><u>Governance</u></p> <p>Configuring templates and roles Validating information Correcting data Monitoring performance Viewing communication logs to resolve disputes</p>
<p><u>Learning</u></p> <p>Searching and reviewing past submissions Reviewing feedback in past docs Reviewing changes made by others</p>

Table 5.3. Generalised Mechanisms

The next two mechanisms consist of voluntary and unintended affordance actualisations. The first group of affordances includes affordances related to knowledge transfer and reuse and the outcome is improved customer knowledge in the organisational memory. These affordances were abstracted in a **knowledge transfer mechanism**. Another group of affordances produces improved human capital at the individual level in the form of better understanding of the organisational practices and requirements. These are affordances including searching and internalising prior knowledge and they were abstracted into a **learning mechanism**. [See fig. 5.2]

5.5.2. Analysis of Dependencies and Relationships between Affordances and Associated Mechanisms

The interactions between the KM system and the individuals were well prescribed in terms of its purpose and mandatory uses. Even so, the results demonstrate variations in how affordances are actualised and in the configurations of affordances that produced the same outcomes. There were a number of affordances and higher level mechanisms that were not intended and not aligned with the original purpose of introducing the system.

A consistent dependence exists between affordances which collectively form a higher level generative mechanism. As they all ultimately support the same goal but create multiple causal paths for achieving the outcome, they are very often sequentially dependent, i.e. an affordance B cannot be actualised before another (A) has been actualised in a specific manner. For example, approving terms and conditions is dependent on proposing conditions. This dependency is very pronounced due to the division of duties where affordances need to be actualised by different roles and the sequence pre-set by the process incorporated in the workflow of the system. However, the pre-set sequential path of proposing, evaluating and approving terms is disrupted and varied depending on how the proposing has been actualised both in terms of quality and the purpose of the individual. For example, some individuals propose terms with the purpose of requesting input and this then results in providing feedback, request for changes, making required changes and then evaluating and approving terms. The relationship is positive in one direction as affordance A supports affordance B and there is no interaction in the other direction. [See fig. 5.1]

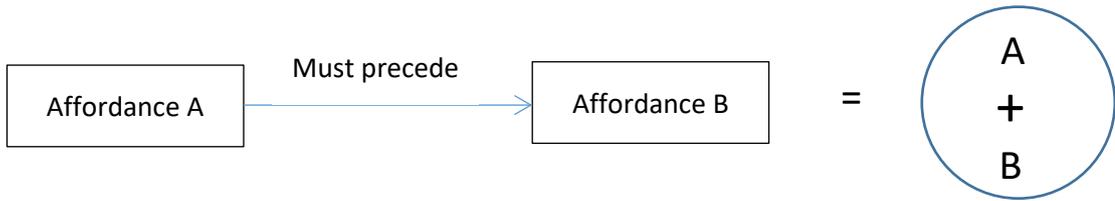


Figure 5.1 Sequential Relationship

The sequential/conditional dependency above is treated as a binary interaction where the existence of one affordance is necessary for the existence of another. In most interactions, the relationship was dependent also on a quality/depth of actualisation. Improvements in actualisation of one affordance contribute to improvements in another. For example, the existence of recording allows for monitoring but this dependency is influenced by the consistency and quality of recording. The data demonstrated that the system records and logs all communications and there is some consistency of communications that are always carried out online. However, some of the communication such as discussions, negotiations and explanations occur offline; and then only the outcome is recorded. This supports the monitoring of results but not necessarily the monitoring of opinions, understanding and performance. This is an example, of a **commensal** one directional supportive positive relationship between affordances and mechanisms where improvements and growth in one affordance are positively influenced by another affordance or mechanism but this relationship is not reciprocal. Affordance B benefits from affordance A, but there is no positive or negative effect on affordance A by the actualisation of affordance B. [See fig. 5.2]

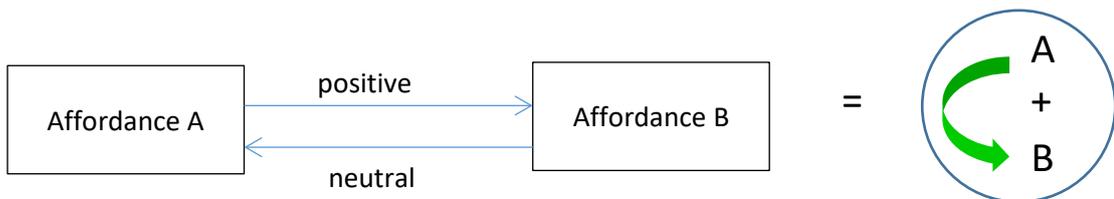


Figure 5.2 Commensal Relationship

The visibility of communications and requests for reworks enabled by the electronic recording supports both monitoring and reporting. First, it makes both the quantity and category of reworks visible and attributable to individuals and departments.

“The reworks still did happen in the old paper based system; generally it was more verbal – come back and go - can you change this; updated this we’d do that and then submit – spin it back to the credit manager and they go ‘yes that’s fine’ and put it further up the chain. Now it’s done via electronically the reworks are more obvious than, recorded on a file or recorded in the CM process itself.”

Then this recording allows senior managers to analyse the quantity and nature of reworks and provide the feedback to units and individuals. This is another example of a commensal relationship as the recording positively influences the analysis. This in turn positively influenced management and the identifying of knowledge gaps as in the past there was lack of acceptance of feedback due to tangible evidence.

“We were just keeping stats on the reason you were sending it back. I think there was about 10 different reasons we found you could send something back and we kept those stats for I think about four or five months - back to the regional managers and say, ‘You know here’s your staff, I guess, are not performing and here’s the areas where everyone maybe - struggles with.’ It meant we had some – because I think credit always are complaining that the business unit’s not doing their job properly and the business unit’s always going, ‘Well, tell us what is it?’ So yeah, probably just gave us a bit more credibility.”

Monitoring positively supports the practice of identifying and recommending positive exemplars to be used as the basis for learning and reuse. Improvements in this goal-directed monitoring lead to more informative and appropriate recommending. This also has improved the effort that people put in contributing to the collaborative authoring.

“To me the behaviour [that it supports] is around - that is actually being able to pick the really good ones, and say here is one you can look at and use as a model, or that everyone knows the ELS is there running and a crap one is going to be there for a while so you know it’s actually

the behaviours are there and certain things you drive because it's interesting, because when people go electronic they behave differently."

Recommending exemplars has had a positive influence on the learning mechanism as it encourages individual employees to review and learn from past cases. While some of them do it in a self-directed manner, others have explicitly stated that they use prior cases when they have been specifically recommended by a superior.

"people go, '[X] – wrote a really good CM. You should have a read."

Another one-directional supportive relationship was observed between training and all forms of proposing terms and evaluating submissions. Originally training occurred in the form of traditional passive transfer during training courses. However, this was considered by many people to be too isolated from the actual practice of writing proposed terms or contributing conditions.

"Previously prior to about 12 month ago, the training wasn't particularly good. In the bank it was more like sitting in and watching, and then of course not all, never 100% transfer of information from one person to the next – always bits and pieces missed."

A new approach was introduced where training is hands on using a workbook which simulates the writing experience. The participation from the trainees provided a more personalised and active training experience and this led to better understanding and improved practices. The variation in the way people experienced the training comes from the fact that it is voluntary and that the participation is not monitored which means that even if individuals attend it, they may not be activating the training correctly.

"I went on a training course and it helped me in what each specific – what they are after what credit managers want to read and what to know...Well, it just gave us, you know, that can only be five or six words, whereas some people put an essay just in that or you've just got to keep repeating yourself."

Positive interactions between affordances do not always represent beneficial actualisations leading to value outcomes. In some cases actualisations of affordance A have a positive

influence on unexpected or undesired actualisations of affordance B. For example, RMs consistently discussed how the viewing affordance actualised by service managers affects the actualisation of verifying terms and conditions. When service managers actualise the viewing and transferring affordance by printing instead of viewing, they miss a lot of information which leads to incorrect finalising of the contract. This leads to verifying of the contracts by the RMs which is not a planned affordance. In effect, the more the viewing is actualised offline the more the verifying affordance is actualised.

Not all interactions between mechanisms have been positive. In some cases the improvement or growth in one mechanism has brought about a reduction or harm to another. One such widely observed interaction is between learning from past cases and reworking. The more an employee uses prior cases as examples to be followed or reused parts of them, the fewer requests for changes and subsequent reworking there are.

“I can go to any customer or any RM and read about them. It teaches you different ways because not every CM is the same. I went from facing quite a few problems with my last manager to finding not many now as I am learning to keep a mental template to know to go through the different managers”

The reworking itself does not harm learning; rather it helps people to learn from the experience as they review either their own or others’ past lessons.

“It’s a wee bit of self training - I’ve got to be honest; you just experience the thing and it’s not rocket science. Once you experience it [reworking] – the more you do the better you get.”

In this case learning has a direct negative influence on the reworking mechanism and at the same time reworking has benefited learning. This is an example of a **parasitic** relationship where one mechanism benefits from and harms another (Fig. 5.3).

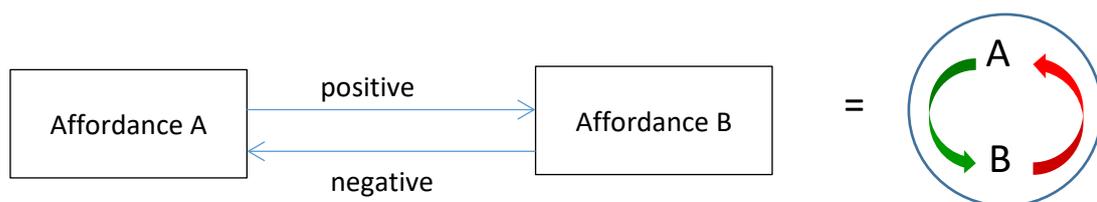


Figure 5.3 Parasitic Relationship

In some cases, more junior staff have reported that this interaction is enabled by personalised coaching. They review prior cases with their supervisors and this helps them to understand the implications of the previous requests for rework but also what was superior in the exemplars. In effect, coaching (C) has a positive one-directional relationship with learning (B) which in turn has a parasitic relationship with reworking (A) and combined they have tri-form interaction where coaching has an inhibiting one-directional influence on reworking (Fig. 5.4.).

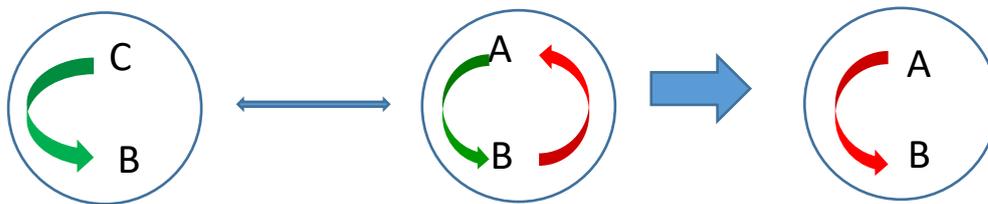


Figure 5.4 Complex Inhibiting Relationship

Others have also reported the importance of mentoring and coaching in preparing contributions. They have praised their superiors on being available and helping through iterations of a document prior to submission online. However, this practice reduces learning for others as the comments and feedback are not recorded in the system.

“for my learning I’ll print it out and then she’ll go in and highlight, ‘You need to add more here. Need to add more here.’ ‘Go away and think about it.’ The next time we’ll print it out, if it’s not right still, she can just write, ‘Put this in here,’ and then through time we’ve gone from (a lot)(laughs) to just (not much).”

Finally, there were some negative one-directional relationships between affordances. An **inhibiting** interaction between two affordances occurs when the actualisation of affordance A affects negatively or harms the actualisation of affordance B. It is negative in one direction and there is no effect in the other direction (Fig. 5.5.).

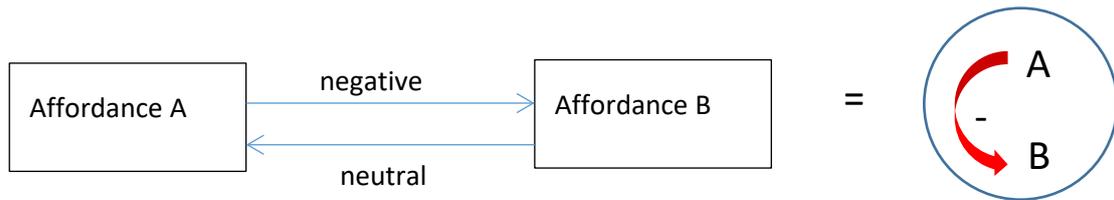


Figure 5.5 Inhibiting Relationship

Affordance actualisations of different systems can interact too and can have a positive or negative relationship. The frequency and consistency of actualisation of the updating affordance for the core system has a negative influence on the actualisation of the duplicating affordance where users are entering up to date information in other parts of the credit document. As they cannot correct it directly in the core system and the sections which are populated by the core system are read only, they then enter the updated values of the same information in other sections.

“If we do a CM and have updated all the security, this then needs to be updated manually onto [the core system] but then if that hasn’t been updated and we need to make just a minor change we have to retype it all in - and if there’s four mortgages and five guarantees and a cross guarantee it just takes time.”

5.5.3. Absent Affordances

The case data revealed the importance of absent or phantom affordances. Respondents discussed affordances that they expect to see and attempt to use but they could not find them. These affordances were consistently present in the interview data and they were discussed in the context of their constraining role to generate and deliver expected value. Users described specific potential actualisations that some of them attempted and others envisaged. For example, users attempted to categorise their contributions beyond the limited set of categories.

“The difficulty is that the system doesn’t allow to select the various types of diary noting. It gives you some options, but not all the options are about what it’s doing, it could be a lot more precise about diary note – about meeting, instead of just saying, ‘general diary note’, it just

says, 'general diary note,' and what's the purpose – 'annual review,' Now you just never know what you've actually written, so it could be a lot more specific in some of things it's doing."

This in turn affects the actualisation of the searching and reviewing affordances. Users have reported that this affordance is in their view incomplete as they can only segment the cases based on a customer and high level types. Then instead of searching, they have to access and review all documents instead of retrieving the document they need.

"Like once you search for a customer it will come up with all the different documents, but it will only say the date it was made or completed - the number –whether it was a CM or a diary note and that's it...there's individual files on the screen, you've got go in to each individual file, open it read it, get gist of it and it's not the right one, exit that one and go into next one. Very time consuming in terms of getting – finding things you are looking for because you don't know what each document..."

The interaction between these two affordances further evolves over time as there are more documents contributed for each customer or a member of staff. Furthermore, as some users have seen the potential of the ELS as a customer relationship management system and record all customer interactions there will be even more documents. Therefore, the more people contribute, the harder it will be to actualise the searching affordance. This is another example of an inhibiting interaction which is enabled and supported by the absent affordance. Some users have even expressed reluctance to look for documents. Users will then not be able to use past documents as exemplars and this eliminates an important element of the learning or communicating mechanisms. For example, one respondent stated that *"at the moment in the bank if you want to find information for one you've got to be almost in the bank for the last 10 years to work out where to find it, and it's all segmented."*

Section 5.4.1 described in detail how some RMs have seen the potential of the ELS for them to record and maintain customer relationship knowledge. As this was an unintended use in the system design, there is a great variation as to how the affordance is actualised. Some users do not record the information at all and have not seen this potential affordance. Others will use different sections or types of documents to record the information. For example, some users will create a single diary note and keep adding to it while the majority of users

create new notes for every interaction. This has a great potential for general managers and some general managers have “discovered” that their RMs include this information and they actively search for it. However, some general managers are not aware of it and they see the potential as an absent affordance instead. They have discussed how they would use a relationship document if there was one but they cannot actualise it.

“Relationship side, so that could be added in, basically so that you know another person could pick up this file and see - well, here’s the relationship you know in terms of you know personal information about that client. Like for example, they like going to the golf every year or you know like just things that might help on that side or what their interests are, so it would help us when we’re you know having people come to present or have speakers for clients that you could then sort of filter your client data base so you know which clients are interested – like economics presentations or something like that. Now we just rely on the relationship manager to know their clients really. A lot of them would just remember it. Some of them might keep their own thing, but its individual at the moment.”

This section distinguishes between system features and specific affordances as actions that users would like to be able to perform in order to achieve their goals. They have been discussed in the context of “lost” value outcomes as the respondents see the potential for value but are not able to actualise it.

5.6. Constraining and Enabling Conditions

The previous section shows how the interaction of affordances and mechanisms can enable or constrain successful actualisation and value creation. In addition, the data presents a number of individual and structural factors which influence affordance actualisation both in terms of consistency and depth.

5.6.1. Individual Factors

Interviewees discussed how the way in which they actualise affordances or the affordances they perceive are influenced by individual level factors that can be divided in two broad categories- personal characteristics/ attitude and competence. These two categories are distinguished in the way they interact with structural mechanisms and organisational

interventions. Competence and skills can be improved and built as outputs of interventions while individual personality needs to be considered as an input for organisational initiatives.

One individual characteristic that respondents noted was their personal motivation and values. For example, personal career goals were discussed in the context of seeking prior examples in the ELS and the way that participants engaged with the training process. The proactive self-directed search of prior examples is an unintended and mostly voluntary behaviour and those who actualised the affordance mentioned that they are influenced by their goals and desire to progress their careers. These goals then inform how they see the potential of the ELS to support them and this view motivated them to make the effort to look for ways to learn from the past examples. Similarly, personal goals influenced both how individuals engaged with the training and most importantly, their perception of the value of training.

“I want to learn and to move forward with my career. Whereas some people might just want to be here from 8.30 am till 5 and they aren’t really – if they can get through doing it that way, they’ll do it that way. Whereas I probably want to be more efficient and learn how people want to read it, so I found the training invaluable...”

Intrinsic motivation related to the perceived impact on the organisation as a whole, and colleagues, has influenced the voluntary actualisation of recording of customer relationship knowledge. Understanding that the knowledge would help their colleagues if they need to deal with this customer or to perform their job better encourages some users to record it and to provide further details. They are also influenced by their assessment and perception of the positive impact and value that will be derived by the business in terms of flexibility in using different staff to deal with the same customer, to provide better value to customers, to improve the reputation of the business and to improve business continuity.

“I personally put it in there, because I guess I run the mentality you need to store that information so other people can access it; if I got hit by a bus there’s that continuity for the business there.”

Personal preferences in terms of **communication style** featured as a constraining factor in the

actualisation of the communicating and recording affordances. For example, some people found it difficult to either express or understand justifications for proposed terms. If the decision making requires a discussion of the issues and making decisions about the information requirements and corresponding terms, then some individual senior managers have offline conversations before codifying the outcomes of it in the system as a rework request. This is partly due to the limitation of written asynchronous communication in achieving mutual understanding. Another reason they have stated is that in some cases they would not like for the request to be recorded in order not to embarrass the more junior staff. Therefore, instead of holding the exchange of questions and responses online as intended, they would first have a face to face conversation and then record the outcomes and summary of the discussion online. However, this leads to loss of information as such recordings mainly record the outcome of the conversation rather than how the outcomes were derived. Personal communication style also affected the actualisation of requesting changes as some senior managers prefer to communicate terms at high level and others are detail-oriented and prefer that all details are articulated. This personality trait relates both to communication and **management style** as some managers empower and trust other staff while others are seen as micromanagers.

“Yes some credit managers are big picture people – so they go yes this is the deal, looks OK, will leave [staff] to deal with the details, and approve, make sure you do this. Whereas you get other credit managers who dive down in the nitty gritty detail and pull out 10 or 20 things that need fixing, hence a whole raft of reworks come back. But that’s – it just depends on the personality of the credit manager, yes so it’s not the system itself. It is not fool proof because there is nothing you can do about that, a credit submission system that can alter the personality of the person assessing it or writing it.”

Lack of interpersonal trust inhibited some staff in using the system as a knowledge repository to refer to exemplars or to find clients who may be similar. Some of them did not trust that the previous examples will be of good quality and therefore they will not meet their learning goals. Others were mistrusting that their colleagues would have included the correct factual information to find the right examples.

“I could type the [industry] code and it will pull up but that’s your reliance on the relationship

team to have allocated the correct code.”

Individuals’ personal aptitude to think logically was considered to enable the actualisation of the communicating affordance and therefore to provide their reasoning and rationale for the proposed terms. This was reported mostly for RMs who need to present their proposals but also for the credit managers being able to connect facts where the explanation is missing. According to the respondents this is not a question of lack of training or experience but rather a natural ability and inclination which affects their style of writing, *“it just seems to be aptitude for being able to write and make it logical”*. Similarly, technical aptitude and being able to intuitively relate to technology features and understand how they can be used was also found to be supportive. *“it’s not just experience; some people are less technically savvy. Some people are more into working out how things work technically and then they work the document better and other people are a little bit less inclined to do that.”*

While natural aptitude and inclination by itself can be an advantage and cannot be trained, **experience** with the system and processes is helpful for all individuals. Experience with the ELS and the lending process was widely reported to enable engagement with the training process, understanding better what is required as knowledge and creating individual mental frameworks as to how to organise the information to be more convincing and clear. At the same time personal experience helps approvers to detect potential issues and missing information even when it is not obvious. However, the experience of RMs influences whether the learning affordance will be activated. If they have had experience with a CM and know what is expected [they think] there is no need to search for exemplars.

“we have quite a large difference between experience. Older people such as myself and X, been round a wee while –we tend to know what has to be attached, other guys still learning, don’t necessarily know what has to be attached....having done it previously always helps. Even actually get picked up any stage in the process, a relationship associate could be doing a CM for a starter and their relationship manager reads it before sending it off to get approved and he could or she could pick up a whole lot of – because of the experience so it’s miles on the clock does count and pick that up – and as a person who’s writing a CM gets more experienced they’ll know that stuff when it’s not looking right as well.”

Prior experience can be a constraint too as it forms the expectations of staff as to what affordances the system has and how they can actualise them. Staff, who had extensive experience with the previous system, kept referring to the fact that they expect to “see sections which are not there” and struggling to understand what is required. This influenced both their attitude to the system as a whole and the way they actualised affordances. For example, some of them perceived affordances to be absent when they were offered by different features, others duplicated actualisation as they were not clear what was the best way of doing it or “they worked around the system and did the minimum amount required”. Some junior respondents commented that their lack of experience with any other system is an advantage as they do not have any pre-conceived notions of how to structure information and find it all easy and “self-explanatory and can get more out of the system”. Prior positive experience with systems in other organisations also influenced **expectations** both in terms of affordances and how they can be actualised. In some cases the expectations were also based on the size and reputation of the bank.

“So knowing what [X bank] has, I got immensely frustrated when I had to come back here and my first process was working with Excel and then they moved into [ELS] So I think if they could do something that would make my life easier because then I only have to check things once.”

“But I mean in my corporate finance time – how I spent – I just worked with base systems – you didn’t have to worry about anything – didn’t have to worry about the system kicking up the fuss. When I came in here I expected the biggest bank in New Zealand to be good, to have a really good system – it didn’t.”

5.6.2 Organisational Factors

The positive influence from the organisational environment in this case came from the clear organisational goals, understanding of the credit lending business process, the implementation strategy and the continuous and improved training. Most of the negative organisational factors present in the data relate in some way to the lack of alignment between the IT and the business functions in terms of their goals and communication. The respondents discussed their difficulties with missing features, technical issues such as lack of stability and

reliability of the system performance and breakdown in communication between the technical and business units (Fig. 5.6.).

As discussed earlier the **business goals** and motivation behind the introduction of the ELS were well understood by all participants. There was a clear understanding that the business goals of compliance and risk management are supported by the process incorporated in the ELS. Even employees who were skeptical to start with, realised why it was necessary and shared that they *“didn’t really see there was anything wrong with the paper-based system we had until really until we’d been using ELS for a wee while.”*

A direct **conversion strategy** positively influenced both the depth and consistency of using the ELS. At the beginning the system was phased in but many people chose not to use the ELS, particularly since there were many technical issues and system crashes. When the main technical issues were resolved, the use became mandatory and this “enforced” use ensured that affordances were actualised to their full potential. Similarly, employees in the Christchurch office reported that they effectively had to use the system even before it became compulsory due to the lack of access to their offices post-earthquake. This ensured consistent use by all staff in the location and they all were well advanced in understanding the system and appreciated the value they got out of it.

“A lot of us who had been in the organisation for many years had been used to using paper based files, so a lot of us didn’t like it – didn’t trust it, so we were clinging on to our paper based stuff, I’m very pleased someone said from this day you have to submit stuff via ELS, end of September we had an actual date – that was a good thing, it forced us to start using it rather than giving us the option to use paper and or ELS.”

Training interventions supported the communicating and collaborative decision making affordance actualisations. In addition to the personalised and group training sessions, training documentation was a positive factor for some staff as it allowed them to continuously refer to it. Many users found the training sessions helpful but the **documentation** helped to affirm the knowledge when necessary. Interestingly some staff were not aware that the documentation existed and in fact suggested that it would be helpful to have some codified

prompts. A senior manager stated that the lack of documentation which prompted associates and indicated what is expected in each section, led to increased requests for changes and offline communications explaining what is required. This demonstrates that all participants recognised the role of codified instructions and examples but for those who were not aware of its existence, it had a negative effect.

“There’s a lot of supporting documentation about how to fill them in - I still use that. I always have sitting beside me a documented credit risks. It always prompts me what to put into the particular boxes, which helps me not to think about it every time. It will give me a prompt on what they’re looking for in that particular area of the credit document.”

The alignment between the IT and business functions influenced both the design of the system and the value realised from its use. The system was designed, developed and implemented in-house. During the analysis of the requirements, the IT team included only senior managers. Senior and risk managers mainly view proposals and add their recommendations and decisions and they were on the whole satisfied with the way the system supports their goals and allows them to actualise the viewing and communicating affordances. However, the needs of the RMs and associates were not entirely understood and even three years after the implementation, there was limited understanding of the challenges for the main contributors. The format supported by the ELS does not allow them to present information in tables, does not have a spellchecking facility and supports only one font type and size. Even the credit managers who have to read more iterations have reported difficulties in reading.

“The stuff that was coming out of ELS the presentation and the fonts was terrible. Wording was all cramped together and just hard work. When you’ve got eyes like mine very hard to read.”

This has affected the way that individual staff “work around” the system. Some would type first in Word and then copy and paste while others will add the majority of the information in attachments which obstructs the actualisation of the viewing affordance. The communicating affordance is also impaired as only the communications between RMs, credit managers and

senior managers were taken into account.

“The overall project was generally run by techo’s IT people – and they would say yes we are going to give you this functionality and options but the options weren’t put in a logical order – that a person who’s using the system would say this helps, so the ELS system in fact restricts...”

“The challenges that we face are more technology based rather than the actual idea of it all and probably the development of it they might not have seen – until you’ve done it, you don’t realise what you’ve missed out on and I’d say the biggest frustration is we can’t do anything – yeah, we more or less can’t do anything without [ELS]. We can’t instruct people in back office to prepare documents because we have to do diary notes for it to be approved and so there’s huge frustrations.”

IT staff reported that they are aware that copying from Word documents will not always work as the ELS has a different mark up and when it attempts to translate from Word, this leads to corruption of the information. IT do not see the importance of the formatting or copying issues and therefore, have no intention of working on improving them. They see the issue as unrealistic expectations while the users see it as a constraint which does not allow them to present the information correctly.

“So there was formatting problems with that Wizzywig editor, some limitations on you know this expectation of, ‘Oh, it’s going to be like Microsoft Word.’ Well, it was never intended to be Microsoft Word; it’s not a replacement for it, so there was some frustration around that.”

There is a very clear **gap in communications** between the business and IT staff. The IT department are located in a different city from the headquarters and most senior staff. They are not aware of the practices of the business although they are aware that they are not meeting the business’s needs. The IT staff also reported that they do not really understand the full value of the ELS to the business and in fact questioned the need of some of the affordances which were most valued by the business (e.g. the ability to access documents created by other individuals). The system analysts saw the access to other documents as

negative and considered it a security risk. They did not think that anyone would access other documents for a “good reason” and could not understand why some people had insisted on it. This lack of understanding and response leads to increase in end user computing and attempts to incorporate data from Word and Excel in the ELS which in turn leads to more issues with corrupted data or the need to open attachments.

“We can’t necessarily respond quick enough to the business needs, so they find hacks around it. So they’ll go and get a data extract out of X and then they’ll merge it together and add some data to it and then they’ll do a whole lot of you know pivoted tables and macros and stuff in Excel and they’ll build a little application in Excel.”

Every respondent extensively discussed technical issues with the ELS and in particular the lack of reliability leading to inability to use the system for periods of time due to crashes, losing work and inability to access data when dealing with clients. While IT staff were aware that these issues existed to start with, they perceived the issue to be largely resolved. This has led to a very negative attitude towards the system by some staff and duplicating data in Word and other applications as *“some guys who still write the stuff in a word document and cut and paste it in, it’s easier, because the stability is not there”*. One of the branches had had a figure with the name of the system on and they would hit it *“when people get rage”*. This creates modification in the way affordances are actualised.

“Yesterday I went down to talk to one of the guys in the credit and he was sitting there because [ELS] was having a migraine and he couldn’t do anything because they are all his stuff, when you’re in – in the dual approval chain and one of them is risk or credit, and those guys are working in ELS so when ELS has a migraine – they’ve just got to wait till they’ve had help! Haha, until the techos get on to it and sort it out.”

There was discrepancy in the view of the business and IT staff in terms of required modifications. Staff in the business units reported that they have requested changes but there is no response so after some time they give up. Some of them even considered that the issue is with the resources that the bank can allocate to the project. While some of the requests would require extensive modifications, others were fairly minor and the IT analyst was

surprised when they were mentioned as he was not aware of them and according to him, some of them already existed.

“To be honest a lot of us people who have been around for a while you get sick of trying to whack your head against a brick wall. If there’s something that really bugs me I do make an issue and bring it to someone’s attention, but quite often nothing gets done anyway.”

There was also uncertainty in both the credit staff and IT staff of the process and workflow of requesting changes and support but it goes through several hierarchical levels on the business and IT side. There is also no process to respond to feedback unless it is a case of the system crashing and then there is an email sent to all staff. Some respondents perceive the issue to be in the inability of users to communicate their needs which led to a lack of understanding. *“It’s inexperience from the operators talking to the IT people, 2 lots of inexperience both saying green or something but not really understanding what each other is thinking.”*

“I don’t know what the process on the business side is, but I’m sure there would be one in terms of talking to their line manager who talks to a head of department and then they would then feed it into our head of technology team, the portfolio management team and then that would filter from there.”

The reliability issues have largely been resolved but the negative impacts of crashes in the initial stages have led to well-established “workarounds” in some cases. This has resulted in undesirable variations in affordance actualisation and persistent negative attitudes at the individual level.

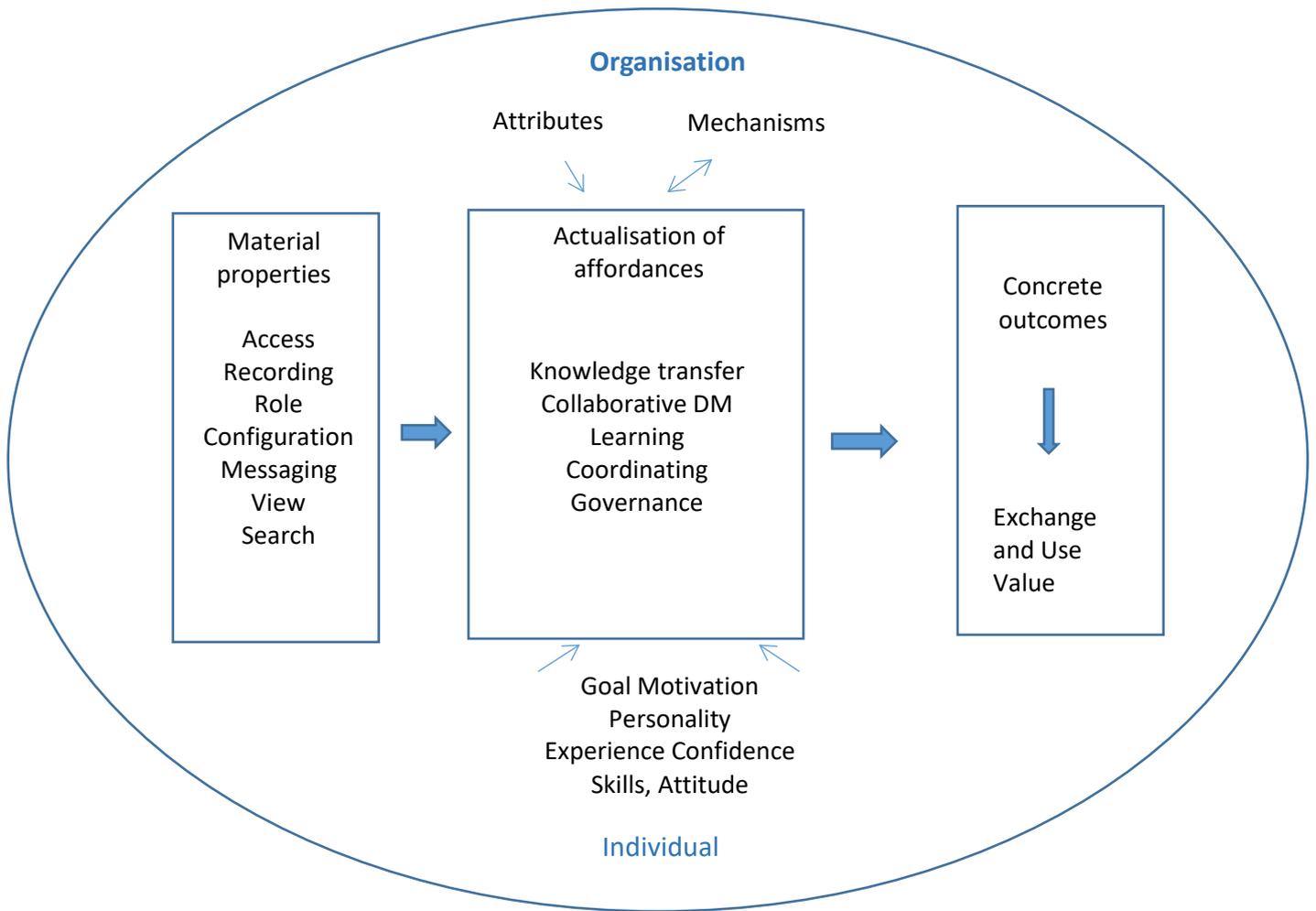


Figure 5.6. KM Value Creation at Bank1

5.7 Summary

This chapter presents the results from the case study of a process-based knowledge management system (ELS) and how users have interacted with it to actualise its affordances and generate value outcomes. The system was developed in-house and the project was initiated by the credit management unit to support the credit lending process and had multiple participants. The process of lending incorporates the judgement and expertise of at least three levels of credit staff. The ELS standardises the process in terms of the tasks and knowledge required and to ensure that all decisions are justified and presented. It inherently incorporates the knowledge of best practice from multiple historic instances of the lending process. It also includes a number of sections where participants need to outline and justify their proposals and judgements using their experience with the client and knowledge from

the industry. All credit decisions have to be made collaboratively through the ELS. The interactions and knowledge elements are recorded and can be accessed by all staff in the bank.

The original intention for the design and implementation of the system was to streamline the lending process, integrate it with technology to ensure consistency and reduce risk. The findings demonstrate that at the organisational level these goals have been achieved. In addition, other intended and unintended value outcomes have been generated at the individual and organisational level. This case provides insights and examples of both separable stocks such as explicit knowledge incorporated in the process-based system and human capital expressed by the experience, firm-specific knowledge of employees and their ability for innovation. The interaction with the KM system generates exchange value for customers and stakeholders and use values at the organisational and individual level of the bank. Shareholders receive exchange value through the reduction of the capital required to be held and being able to invest it instead for returns. Clients receive value in time and cost savings, improved accuracy and response time for contracts, which deliver the correct amount of funds sooner. They also receive use values such as an improved relationship with their bank and service quality. The findings of the case study demonstrate the difference in perceptions of use values and the lack of awareness from some stakeholders of actual and potential value.

All of the exchange values to clients and shareholders were dependent on the generation of use values internal to the organisation. At the organisational level there are cost and time-savings, compliance and risk reduction, process consistency and business continuity. For example, business continuity leads to the immediate availability of a RM to help a client at the same level as someone they have dealt with before. This improves the accuracy and speed of the response and ultimately saves the client time and cost. Finally, at the individual level, employees perceived use values as flexibility in work location, improved knowledge and expertise and improved confidence when dealing with clients.

The value outcomes are not always directly generated from the interaction with the material properties of the ELS. The interaction itself generates concrete outcomes such as accurate contracts, or elements of it and intermediate outcomes such as proposed terms, requests for

changes and codified customer interactions. Retroducting from these concrete outcomes, the entities involved were investigated and a number of single affordances were revealed to explain how these outcomes were achieved. This analysis identified variations in how affordances were actualised to achieve the same result. They formed different pathways that were followed to achieve the same outcomes. Based on a common main functional outcome and similar releasing and enabling conditions, this set of single affordances was then abstracted into the following generative mechanisms – knowledge transfer, collaborative decision-making, coordinating, governance and learning.

The purpose of the knowledge transfer mechanism is to externalise or internalise codified knowledge. It includes affordances, which involve both articulating internal knowledge by individuals but also accepting, reviewing and reusing knowledge which has already been codified. The sets of affordances forming the decision-making and coordinating mechanisms support all participants to contribute their input in the lending documents, evaluate others' input and to ensure that the process is supported as designed. The goals fulfilled by all of these affordances are closely aligned with the original goals of the organisation in initiating the design and implementation of the ELS. In addition, the actualisation of these affordances also enabled the unintended affordances, which form the governance and learning mechanisms. The codified knowledge and communications provided managers with the opportunity to monitor individual performance and plan the workloads. In contrast, the constraints of the actualisation of the information transfer led to the unintended affordances of validating and correcting information. The final set of affordances utilises the potential provided by the codified knowledge and universal access to improve the process and customer knowledge of individual employees and subsequently the quality of the process and customer service.

At any given time there are multiple affordances that exist providing potential for action. They are not static and unchanged but vary in their individual actualisation according to the specific context. The actualisations are enabled and conditioned by other affordances, existing structures and individual characteristics. One affordance can be a link in the chain formed by several affordances leading to an outcome and then the dependence is one-directional and conditional. In this case one affordance needs to be actualised before another. Other

relationships are more evolving and reciprocal. The data in this case has revealed that the interplay between affordances and mechanisms can have a positive, negative or neutral effect. The data reveals multiple examples of commensal interactions where the actualisation of affordances encourages and supports the actualisation of another affordance without any benefit or harm to it. However, there are also cases of parasitic relationships where affordance A benefits affordance B but the increased actualisation of affordance B harms and diminishes the actualisation of affordance A. There were also examples of one-directional negative inhibiting relationships where the actualisation of one affordance reduces or constrained the actualisation of another. These paired links can also interact with other existing affordances as interplaying strands and form more complex relationships where even if the paired link is positive, the interaction with another mechanism can have an inhibiting effect on it.

A number of factors at the individual and organisational level were identified, which constrained or enabled the actualisation of affordances and the outcome generated by mechanisms. Individual factors included personal characteristics and traits such as communication preference, motivation, technical aptitude and management style. These personality characteristics affected how individuals chose to actualise affordances and adapted the process and the interaction with material properties to suit their needs and goals. Other individual factors were related to competence and experience and they can be built on to ensure that they enable full actualisation. While competence builds confidence and ability to actualise affordances and to understand the potential for actions, prior experience in some cases had a constraining effect as it created expectations, which were not aligned with reality. At the organisational level interventions such as active training, communications of goals and implementation strategy had an enabling role as they encouraged users and improved their competence. However, this case highlights the role of the IT management and IT alignment. There are significant gaps in the understanding of IT staff of the business needs and goals and lack of communication between IT staff and business users. This affected the design of the material properties of the ELS and contributed to the emergence of persistent phantom absent affordances. The poor communication also contributed to the lack of reliability of the system and subsequent emergence of unintended and undesirable variations in

actualisations, which involved duplication of work or storing of valuable knowledge outside the ELS.

Chapter 6 Case-to-Case Synthesis

The previous chapters have presented the within case analysis for Bank1 and Bank2. Both cases involve several sites and units and have provided variations in value outcomes and affordance actualisations within the cases. The planned purposes for the two KM systems were different as one focused on knowledge creation and the other one on process codification, knowledge sharing and application. This allowed collection of data related to all knowledge management processes. The purpose of this case-to-case synthesis is not to compare and extract only common findings but to also treat all the data as one source and abstract findings and consistent themes to reach integrative understanding. This chapter aggregates the analyses from both cases and discusses the findings with reference to the literature and the identified research gaps.

6.1 Value

The literature review in Chapter 2 based on the IS and KMS research identified gaps in conceptualising value as a comprehensive construct which includes objective and relational values at individual, process and organisational level. Recent research in IS value calls for empirical instantiations for all types of value and for research to investigate the relationship between values. This section analyses the data from the two cases to identify observed instances of value related to the use of the KMS and their relationships.

6.1.1 Value Taxonomy

Review and analysis of the data of both cases identified examples of value linked to the use of KMS and they have been organised in a taxonomy according to the level and the type (tangible or intangible). The results are presented in Table 6.1. with the items repeated in both cases in **bold**.

Organisational values:

At the organisational level the majority of the external values were intangible. They could be broadly organised into three categories – customer service, new products and

services and competitiveness. In both cases customer service values such as satisfaction, service quality and customer relationship capital featured frequently. This may reflect the nature of the banking industry as a service industry within a competitive environment. All of these values were also planned and aligned with the organisational goals. In both, organisations customer service was recognised as an important priority by all employees and they valued relationships with customers and their ability to help them. However, this intangible value does not necessarily translate into a tangible value as senior managers stated that in this competitive environment customer service is linked to value and customer retention and not necessarily growth or profits.

The value theme of competitiveness is represented by competitive response, business continuity and sustainability. Competitive response refers to the value of being able to offer a service or product in response to what competitors are providing. For example, in Bank2 some of the online tools to provide convenience to customers were developed to meet customer expectations in light of what competitors were doing. Business continuity refers to the ability to function under unexpected conditions such as unavailability of staff due to leave, resignations or natural disasters limiting capacity. This was identified in the context of competitiveness and being able to maintain standard of service when demand or capacity fluctuates.

New products and services featured in Bank2 as a direct result of the introduction of the knowledge creation system. These included products targeting specific customer segments (e.g. school children) or offering services leading to improvement of customer service (e.g. classes for customers). New products may lead to additional revenue but new services were considered to relate to retention and loyalty. The personalised targeted recommendations to customers were aimed at generating new business from existing customers based on information they had shared. Therefore, this value may translate into improved profitability.

Only Bank1 reported external tangible values related to the reduced risk of non-compliance, inaccurate risk profiles and decisions. Senior managers considered reduced

risk of non-compliance as tangible because there are very serious financial penalties for non-compliance. However, they also discussed reputation at costs due to non-compliance as well. On the other hand, the risk category allocated to a client determines the capital the bank needs to hold and incorrect allocations leads to greater amounts held in reserve. This results in a significant loss of revenue as they cannot invest those funds. Therefore, this was the only actual realised financial value through the investment of the released funds.

Internal tangible organisational values fall into two categories – productivity and reduction in costs. The operating officer and other senior managers at Bank2 reported that the widespread use of the knowledge creation system as a platform for sharing and for supporting requests for help has reduced training costs as it has effectively outsourced the training to other employees. The electronic access to data and the ELS at Bank1 led to a substantial reduction in consumables such as printing, storage space and paper. It also eliminated travel and accommodation costs for auditors and for managers needed in areas of increased workload. This access from any place at any time has led to increased capability to distribute human resources across geographically dispersed regions and to ensure that everyone has an even load. This has led to a reduction of backlog and of idle resources. In effect, this capability is related to the increased productivity of staff. Another way of increasing the productivity of staff has been achieved by the system ensuring that all information is complete, leading to reductions of rework and better utilisation of staff time. Bank2 has also reported improved productivity due to changes in structures so reducing the waiting time and holdovers.

Internal intangible organizational value includes human resource indicators and organisational capabilities. Bank1 reported that the knowledge creation system supported a collaborative environment and connections to people which improved employee engagement. This was also accompanied by increases in employee empowerment and satisfaction as reflected in feedback, an employee survey and the interview data. Employees reported that they felt important and that their jobs had more meaning than simply working for a salary; many acknowledged that “they are heard”.

Ensuring that every employee “has a voice” was one of the planned outcomes of the system and the results confirmed that it has been achieved. Bank2 also reported that the use of the IG has led to the development of an innovation capability within the organization as expressed by improved structures for product development, reduced cycles of product development and “getting it right the first time”, and creating an environment supportive of the individual creativity. Interviewees reported that even reading other people’s ideas “sparked” their desire to come up with new suggestions. Bank1 reported that the combination of workflow, universal online access and the transparency of status information has built up a coordination flexibility allowing individuals and managers to coordinate workload and resources, better monitor progress and performance and subsequently improve efficiency.

Process values:

In contrast to the organisational level, the majority of the process level values were tangible and assessed by efficiency and quality measures. These were planned and anticipated in the case of Bank1 as the KMS was created around supporting the lending process. Access to shared knowledge led to reduction of duplication (fewer re-submissions and re-work) and improved response to customers both in terms of the timeliness and the quality of the response. The overall completion time was reduced which improved the response time to customers. The access to detailed customer history led to improved quality of responses to customer queries and elimination of the duplication in collecting the information from the customer at the point of query. This is not just an efficiency gain but also reduces customer frustration. Reduction in duplication was reported in the call handling process at Bank1 as a direct result of a collaborative re-design of the process. This not only reduced the time it took to handle the calls but also eliminated the cost in the call centre. Bank1 also reported substantial reduction of legal costs and cycle time at the process level due to the standardised legal term options incorporated in the system. The quality measures of the lending process in Bank1 were completeness of the required information and accuracy of the decision. These could be considered intangible values but in this case they were assessed by the reduction of rework if the terms document was incomplete or if the final terms were incorrect. The reduction of rework can be measured in financial terms as labour costs so the values

were categorised as tangible.

Level	Tangible value	Intangible value
Individual	Productivity	Human capital Knowledge of products, processes and services Reputation Social capital Job satisfaction Flexibility in working time/place Improved quality of submitted work
Process	Process performance - efficiency Customer response time Reduction of duplication Improved decision accuracy (reduced rework) Reduction of legal costs	Satisfaction with internal IT support processes Process quality (completeness)
Organisation - internal	Productivity Reduction in training costs Reduction in paper/printing costs Reduction in accommodation/travel Resource distribution efficiency	Employee satisfaction Employee empowerment Employee engagement Innovation capability Learning capability Coordination flexibility
Organisation - external	Compliance Reduced risk Increased capital availability	New product and services New customer service tools Customer satisfaction Customer service quality Customer relationship capital Competitive response Business Continuity Sustainability Personalised targeted recommendations

Table 6.1. Instantiated Value Taxonomy

The only intangible value at the process level was reported at Bank2 with reference to the IT support process. In particular, it referred to the process of how employees can report issues and request improvements to IT tools. Prior to the introduction of the IG, staff needed to complete and submit a form on the intranet. However, hardly anyone

was aware of this option and they were reporting suggestions to their immediate supervisors. From the employees' perspective there was no transparency as to whether their suggestions were forwarded and explained properly. Some of the managers admitted that they were not sure how they were meant to forward the comments so they did it when "there was an opportunity". From the IT department perspective, they were not sure if they received all suggestions and when they did, they were not sure how well supported the suggestion was and how it should be prioritised. With the introduction of the IG, suggestions receive votes and comments and this provides a clear representation of support. The CIO stated that even when people are complaining about an issue with a tool, which does not exist, they still find that very valuable as this points to people not understanding how to use the tool. As a result, all employees were very satisfied with the new process. This outcome was not entirely planned as the original instructions were that the system is a platform for ideas for new products, tools and services.

Individual values:

At the individual level most of the reported values were intangible. The values can be categorised as either improvements in intellectual capital or satisfaction factors. Most of the values were not planned or anticipated. Employees in both banks reported that the introduction of the KMS has increased their job satisfaction and a common intermediate outcome was the reduction in non-value added work, such as duplication in data collection and repeated tasks, and the associated frustration. Employees in Bank2 also felt more satisfied with their jobs as contributing to the IG made them feel that what they were doing for the bank was important and meaningful. They also felt that helping others through the system and proposing good ideas increased their recognition and reputation in the organisation. Employees in Bank1 on the other hand were more satisfied with their jobs as the system allowed them increased flexibility and this allowed them to balance their work and life better. It also allowed them to provide meaningful responses to customer queries when they were not in the office. Junior staff also noted that they have improved the quality of their work, which increased their satisfaction.

Human and social capital were reported by most users in both banks and they assessed these capitals as their most valuable gains from the use of the KMS. Human capital examples included company-specific, industry-specific and job-specific tacit knowledge, skills and capabilities. While some of the employees in Bank2 also reported that there was an improvement in their factual knowledge of tools, products and services, the majority of respondents emphasised that the value of the system for them was in the internalised experience, and applied knowledge and skills that they developed. In most cases there was supportive explicit knowledge in the form of manuals, pages on the intranet or even instructions incorporated in the system. However, many employees explained that they either did not know how to use the knowledge or it was open to interpretation. This was particularly interesting in Bank1 as the knowledge of the required elements of the submission had to be applied to the context of the internal process requirements, the target reader/approver and the industry of the customer. The same instruction in terms of what they had to write was implemented differently depending on how the user interpreted what was needed, their knowledge of what the approver expected and how much and what detail was required based on the risk profile of the individual customer and their industry. Users explained that without access to the context-specific knowledge instances in the system, they would need actual experience with all specific approvers, customers and industry to gain this knowledge. However, as they have access to all previous credit documents, they can find exemplars associated with an industry, approver and a type of customer. In addition, there is further valuable contextual knowledge in the recorded communications between the document creators and the approvers which can highlight what the approver was specifically looking for and what changes they have consistently requested.

Social capital was also highly valued by individual employees and was often mentioned in the context of the distributed multi-site organisational structure. Social capital outcomes varied from simply making the acquaintance of an employee with the same position but at a different location, with an exchanged communication leading to shared understanding, “knowing” of experts, and collaborating with someone else in the organisation. In some cases all communication was supported by the system and in other cases the system enabled users to identify experts whom they can contact and continue

the communication offline. The connection enabled by the system was valued in terms of the received help, collaborative outcomes, feeling of being part of a network and “not feeling isolated” so there are cognitive, affective and structural elements to it.

Finally, improvement in productivity was the only tangible value reported at the individual level. Individuals talked about being more productive by having more time to focus on value-added activities, doing a better job, achieving their personal goals and being more efficient. A few people linked the improved quality of work (categorized as an intangible value) to improved potential for career progression within and outside the organisation. However, most individuals placed intangible values first.

6.1.2 Relationships between values

The value creation literature proposes that use values lead to creation and capture of exchange value. In the IS literature, there are few empirical studies examining the relationships between different values through correlations between intangible and tangible value, or between internal and external value. However, in many cases the models combine different types in constructs. For example, organisational performance has included both operational performance (cost saving) and external financial value. Then the intermediate value may be an organisational capability or an external value. There has not been work on the relationship between individual and organisational level values. Therefore, there is need for theoretical grounding of the relationships and provide evidence of relationships. This section provides two excerpts from the interview data to demonstrate value relationships.

Scenario 1 Help received:

An employee A posts a question about a customer need and how they can deal with it. Employee B is an experienced senior member of staff and she mainly logs into the knowledge creation system to vote for ideas or to see if someone needs help by asking a question or posting a suggestion for an idea that already exists. Employee B replies to Employee A and explains how task can be done with an online tool. Employee C posts another comment that they did not know that there was such an online tool and this is helpful. Other users also confirmed that they found it helpful as they were not aware that this shortcut existed. Employee B is happy that she was helpful. She used to check in the system regularly but the number of posts has increased significantly in the last 6 months as people have realised that they can ask questions. She finds that she is logging in less and less as it is very time consuming and distracting to go through so many posts.

In scenario 1, value is generated by different individuals and each of them contributes in different ways. The value captured by all participants apart from Employee B is that their human capital has been improved. As a result, they can perform their job better. The intermediate value is the effective use of the existing online tools. At the organisational level, the external value created is good customer service as customers' needs are met. Employee B gets satisfaction from helping people but overall, she loses some of her value as she has less time to do her job and by the way her performance is measured, she is less productive. This scenario demonstrates that it is important to have an alignment between the value created and value captured. In this scenario employee A contributes to the value creation by asking question and initiating the process. For that effort they capture value and the other individuals capture value in return for monitoring posts. However, a critical contributor is on the whole capturing negative value.

Scenario 2 Process improvement:

A group of call centre staff talk about their frustrations at morning tea. There are two teams of first line assistance dealing with two types of customer queries – technology team and banking services team. There is no customer phone line for the technology team. All customers call the Banking team first. They have to wait on a queue to talk to a team member and explain their issue. If the issue is technical, the member of the Banking team forwards the call to the Technology team. The technology team is situated in a different building so even when it is a relatively simple question, the call is transferred. The customer then needs to wait on another queue and repeat the description of their problem. Customers are upset that they have to wait and explain twice. The call centre staff are also frustrated because they are wasting the customers' time and in the meantime other customers are waiting to talk to them. The call centre

staff members are also resentful of the technology staff who in their view are protected and only receive the calls they can answer. After their talk, one of the team members puts forward the idea to create a separate technology phone line. The technology staff comment that they agree as customers are always upset by the time they get through to them and it takes longer than necessary to understand their issue as some time is taken first with customers complaining about the process. Then another person comments that customers may be confused and not be sure if their problem is technical or service-related. After an online discussion, an idea is proposed for the two teams to relocate to a common area, have two dedicated lines and floating helpers. As a result, they can now respond to customers directly, have learned a lot more about the common questions for the other team and all customers are served as soon as they get through. The queues are shorter as customers are not unnecessarily explaining their issue twice, the call centre and the technology team are a lot happier as they are able to help every caller and they are not wasting their time and the customer's time with duplicated data collection. They are now part of the same team so they feel they can work better together.

This scenario is an example of well-balanced relationships between the different levels and types of value. Each staff member contributes value by sharing their experience and offering suggestions. When the exercise is completed, the immediate concrete outcome is that a new structure is proposed. At this stage there is only intangible value captured for the individuals in the form of satisfaction and relationship capital. When the new structure is implemented, the value at the process level is significant gains in efficiencies. This then also contributes to productivity at the individual and organisational level and customer satisfaction. The flows of value go in both directions and both internal and external value is captured (see Fig 6.1)

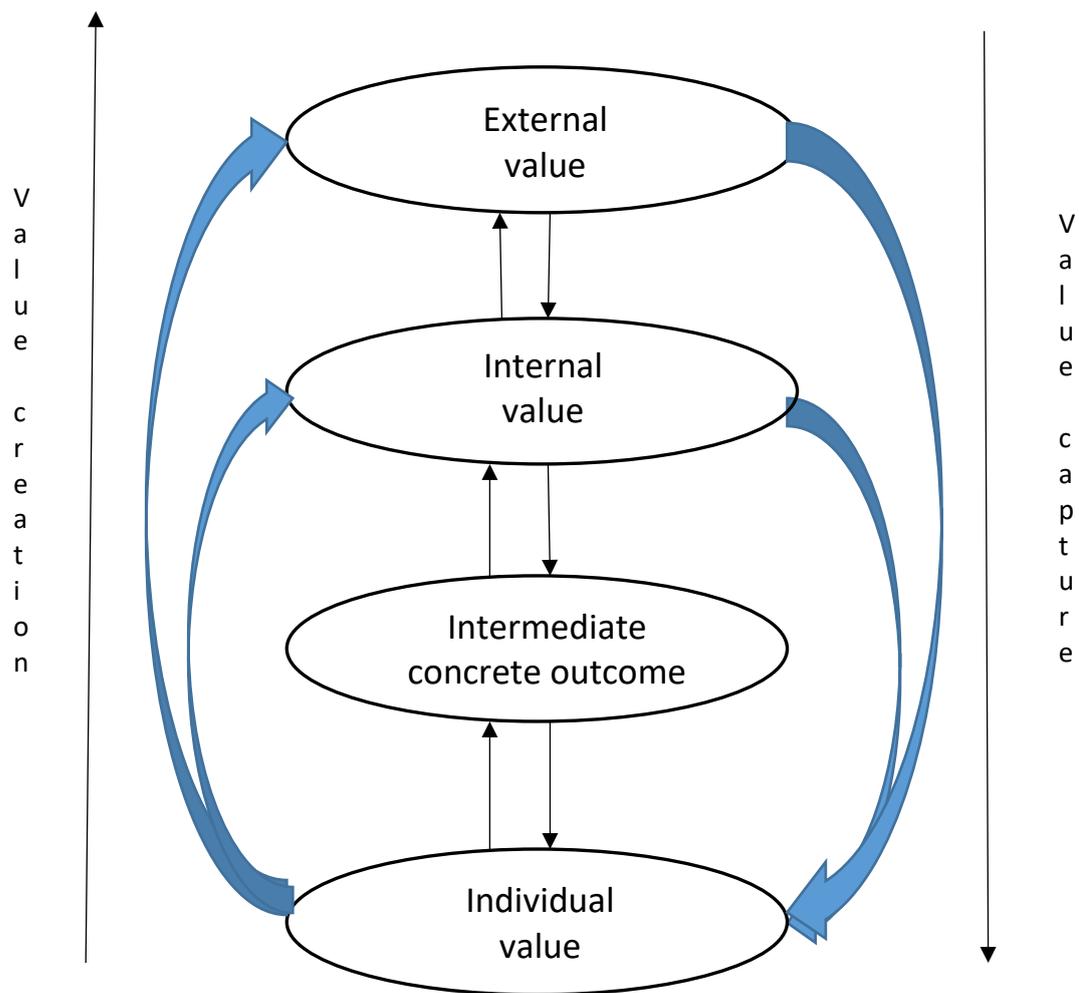


Figure 6.1. Multi-level Value Relationship

The case data is rich with examples of value created at different levels, which demonstrate that when the conditions are right, individual, and internal and external value are positively related. However, it is not necessarily the case that intangible values are directly related to financial performance. The relationship is dependent on the organisational goals for the system and in both of these cases the goals were not consistent with financial performance. For example, participants from both banks reiterated that better customer service does not necessarily lead to increased profit. However, in reviewing of their reports they all acknowledge that the customer service improvement is related to internal financial performance such as process efficiencies and resource distribution. This has implications for some of the existing conceptualisations of value where operational performance and external financial performance are

combined into one measure of value or there is only perceived external financial performance is viewed as a measure of value.

6.1.3 Conclusions

In conclusion, the data on the instances of value clearly demonstrates that KMS are a source of value creation for organisations and that different KMS create different forms of value, closely related to the organisational goals. This evidence sheds light on some of the issues raised in the literature such as mixed results and lack of significance in relationships with external financial performance. The majority of the external organisational values reported were not tangible in this case and they were not intended to be. The external values were measured by improvements in customer service, competitiveness and innovativeness where most of these values were planned. However, there were a number of planned and unplanned internal tangible and intangible values and, the majority of the process level values were tangible.

The purpose of this study is not to reject or confirm existing models but rather to explain why there are conflicting results. Reconciling these results with the majority of the literature sheds light on the mixed results in empirical studies. The majority of studies represent value as perceived external financial performance. In contrast, for these cases the respondents stated that there is no increased revenue or profitability according to them. Prior literature considered customer service dimensions as an intermediate value which fits with the results in this case. The cases further show that the value outcomes were well aligned with the original goals of the organisation, the nature of the industry (e.g. service-oriented, level of competitiveness) and the individual goals. The intermediate intangible values were also dependent on the type of system. For example, the knowledge creation system produced innovativeness value while the lending system was aimed at process support so there was no element of innovation expected or achieved. This demonstrates the importance of the disaggregation of the KMS resource to produce meaningful and consistent results.

The data traced the value relationships from the individual to the organisational level and the relationships are largely positive but not linear and one-directional.

Organisational values were achieved when they were aligned with the individual level value. The immediate concrete outcomes resulting from the affordance actualisations do not always hold a realised value. For example, in the case of the knowledge creation system at Bank2 the immediate concrete outcomes were concepts of processes or products (e.g. scenario 2) and required the performance of organisational mechanisms to realise the value. This explains the issues with the attribution of value reported in the literature. The immediate concrete outcomes provide the bridge to higher level values.

There were a number of unanticipated outcomes at all levels from the use of the KMS in both banks. At the individual level both banks reported the generation of human and social capital which was highly valued by individual employees. These were outcomes from emergent and unplanned uses of the KMS. As a result of this emergent nature and the silo structure particularly in Bank1, there was lack of awareness of this value outcome in some units and at some hierarchical levels of the organisation. Bank2 has a relatively flat structure and the learning element through questions was transparent to all as they are visible. However, learning from “watching” was not as consistent and there was lack of awareness of it as well. This has implications for the diffusion of the value realisation across the organisation and for the overall perception of the value of the KMS. If some people are not aware of these positive results, then to them they do not exist. At the organisational level the unanticipated outcomes were the reduction in training costs and the increase in employee satisfaction. In Bank1, the development of a learning capability, business continuity, sustainability and personalised recommending were unexpected. The use of the system to develop new business through the personalised recommendations was isolated to one of the units and even though the value of new business contributed at the organisational level, it was an outcome only for that team. Again, these unexpected outcomes were not immediately present after the introduction of the system. This introduces a temporal dimension to value and has implications for studies value outcomes for results of newly implemented systems.

Finally, it is interesting to note that human and social capital and other knowledge outcomes were uniformly reported by all even though they were not planned for either of the KMS. This confirms the ideas suggested in the literature that KMS are unique in

their deployment and generation of knowledge stocks. Individuals needed knowledge as input and they captured knowledge value outcomes. The results also demonstrate that these knowledge stocks are not static and are continuously renewable. As Chapter 2 outlined, the theme of the value of knowledge has been and still is the subject of debates as there are arguments that factual knowledge (true belief) or explicit knowledge do not have value unless they are protected by copyright. The premise that only tacit knowledge has value has led some authors to assume that IT-based KM initiatives cannot generate value unless they connect people to people. The findings of this study lead to conclusions closer to Kvanvig's proposition that it is not knowledge but understanding that has distinct value (Kvanvig 2003). Interviewees consistently discussed the value of the knowledge they acquired which is not only relational to the context of the company and the tasks but also relational to their existing knowledge and understanding. They explained that they valued not just the 'know-how' providing instructions on an application (as this was available in the form of manuals and instructions) but the deeper knowledge that is closely connected to the performance of the task which then develops into an internalised skill-based knowledge.

6.2 Affordance Actualisations

Affordances are present in the real domain irrespective of the individual actors and their actions. However, to generate value outcomes they have to be actualised by users and these actualisations are conditioned by the existing structures. Chapters 4 and 5 present the individual actualisations in the two cases. The data showed that the same concrete outcome is achieved following different paths/ compositions of affordances. Each affordance actualisation is a link in a chain that forms a mechanism leading from the interaction between the goal-oriented actor and the KMS to a value outcome. The same mechanism can contain different actualised affordances because at the micro level the individuals are influenced by their goals and contextual factors as discussed in Section 6.3. When the function or goal is common to a group of people based on their role and is serving organisational goals, the affordance actualisations achieving this goal are organisational affordances and they form more stable organisational level generative mechanisms (Strong et al. 2014). This section analyses the data at the level of an

individual actualisation to understand how these individual instances have contributed to the emergence of the mechanisms to generate value at the organisational level.

As suggested by the literature (Volkoff & Strong 2013), in the context of this study individual affordances can be both enabling and constraining to value creation. For example, the affordance to feed in standard financial information automatically, enables information input, saving data entry time and ensuring that there is only one source and storage of data. However, some users have found it constraining as it is fixed in its data format and content and it does not allow users to add any other data or change the way it is presented. Some of the users have found this constraining to their presentation of vital information to support their proposals. The constraining property of the affordance above has led to variations in the actualisation of this basic affordance as some users have created separate spreadsheets outside the ELS and then either copy and paste tables or attach the information.

Other users have reported that the automatically generated information sheet is not up to date and the information is incorrect. Then the affordance is constraining as it does not allow users to correct the information. They then deal with the issue either by adding the correct information in the body of the document and providing an explanation about the discrepancy in different sections or they email the staff in charge of the maintenance of the core system and request an update of the information. Furthermore, as discrepancies appear not to be exceptional and happen often, this has led to an additional unexpected affordance actualisation of checking the data. Therefore, the constraining nature of the data input affordance has led to additional activities which cost time and frustration but do not add value to the original purpose of input and therefore they are value destroying activities.

Unexpected affordance actualisations can also lead to desirable value outcomes. This is illustrated by goal directed affordance actualisations related to seeking help or “watching to learn” about the bank processes at Bank2 and the proactive search for relevant prior cases at Bank1. In both cases these actualisations were completely

unexpected and the affordances were not considered by the developers. On the contrary, the IT staff at Bank1 were strongly opposed to shared access to cases and attempted to restrict it. The shared access remained only to allow for the equal allocation of staff across the regions and for business continuity.

The findings demonstrate that even when the use of the KMS is mandatory and fairly prescriptive, there is a degree of voluntariness and initiative determining if and how some affordances are actualised. Some unexpected affordance actualisations may be limited to individuals or teams and the other employees may not see the same potential or they may not have goals aligned with the outcome. For example, let's consider Scenario 1 from the previous section. Not everybody would need help with tools in Bank2 and for those who do, there are alternatives to using the knowledge creation system (e.g. intranet). For this affordance there is no need to have full **breadth** of actualisation across the company to achieve organisational outcomes. However, one example of unfulfilled potential of the full organisational value is the limited breadth of the unexpected use of the ELS at Bank1 to identify potential new products that an existing customer may be interested in and in this way to generate new business. This was limited to only one branch of the bank and the interviewees in the other branches were completely unaware of this potential.

Both of the examples above refer to unplanned affordances and therefore, it may not be considered necessary by the organisation to have full **breadth** of actualisation across units. However, in the instances related to mandatory use, the breadth of the actualisation across the organisation becomes more important. For example, in Bank1, the instructions and expectations were that all communication around making the decision to approve a loan will be conducted online through the ELS and be recorded to support audit, compliance and to improve the quality of the decision. However, interview data and review of some of the case examples show great variations of the actualisation of the communicating affordance. Some teams have actualised it completely while others have varied the actualisation by conducting conversations offline but recording the outcomes of the discussion (i.e. decisions on changes required).

This partial actualisation meets the requirements of an audit but leads to loss of learning potential. Finally, some senior managers have reported that if the submission has a lot of issues, rather than record them, they talk to the RM, agree on what needs to be done and then they withdraw the case and submit a new one. In this situation, if the recording is reviewed, it would appear that the RM submitted a complete and accurate case the first time and there were no requests for changes. The record will be misleading and will eliminate the learning potential from the exchange. This example demonstrates that both the breadth and the depth of the actualisation of the communicating affordance influences the organisational value outcome and will also affect other affordances and mechanisms. (to be discussed in 6.5.).

The discussion in this section demonstrates that the causation between the affordances and the outcomes is not always positive. Unexpected actualisations can be undesirable leading to loss of value. The depth and breadth of affordance actualisation can also have a negative or a positive influence. Another theme from both cases is the influence of **absent affordances**. In the critical realism ontology, absences are defined as things that should be there but are not and they are part of reality as much as positive presences (Bhaskar 1994). Mingers and Standing (2017) argue that absences can be causes of events but only when there is an expectation of presence which is not met. They also differentiate between an absence of an event and the action leading to absence. For example, missing functionality is an absence of a thing but the need to reduce the production of irrelevant information is an action to absent it (Mingers and Standing 2017). To identify missing affordances, an event can be retroduced and explained by a missing mechanism rather than a present mechanism.

There were a number of absent affordances identified in both cases. For example, in Bank1, the relationship managers discussed at length the effect of the missing automatic generation of a contract from the final approved credit document. They described in details how they expected it to work and what the negative consequences of not having it were such as duplication of data entry, human errors and an additional unplanned validation affordance. On the other side, the facilities managers (FMs) believed that the basic printing affordance resulted in the printing of all parts of the final approved

document. However, the document was not expected to be printed and as result, the FMs were only printing a part of the document which was the current open tab. In Bank2, the searching affordance was absent and users kept describing how “it should work” searching and retrieving posts by the original creator or a subject. There were strong expectations of these affordances which in some cases were based on prior experience with other systems and in other cases on “common sense”. Ultimately they were real to users even if they were **absent**; to them these are **phantom** affordances that they can perceive working and expect to find them but when they look, they are not present. In all of the events in the interview data, these phantom affordances had a negative effect on the value outcomes and on the performance of other affordances and mechanisms.

6.3 Contextual factors linked to affordances

As discussed earlier, affordances exist in the real domain but they are only actualised when individuals perceive the potential and act upon it. Actualisations vary in the interaction between the system and individual, in the depth of the actualisation and the breadth of actualisation in the organisation. All of these aspects of the actualisation are influenced by enabling and constraining conditions and by the interaction with organisational structures and mechanisms. The data showed that at the micro level of the actualisation there were a wide range of individual factors influencing users in how they perceive the affordances and choose to actualise them. The interaction itself is influenced by the organisational environment including structures and interventions. This section discusses the enabling and constraining conditions in three categories - individual, organisational and technology factors.

Individual factors:

Affordance actualisations are goal-oriented actions and this is apparent from the data. The individual’s goals when they interact with the KMS inform how they perceive the potential for use and are in turn motivated by the broader individual and organisational **goals**. Understanding of the organisational goals informed the perception of how individual actions will **impact** the organisation and colleagues. In Bank2 where use is voluntary, interviewees discussed how they believe that their participation contributes

to achieving the organisational goals and priorities and makes them feel that they “are part of trying to make the whole bank better”. In Bank1, the voluntary recording of customer relationship knowledge was motivated by the understanding that it will help other colleagues to serve a customer if they are not available and this will improve the bank reputation and the business continuity. The goals of the organisation were also discussed in the context of the mandatory recording of communication through the KMS. There was common understanding that the goal of this recording is compliance for audit purposes and everyone talked about the importance of it for the functioning and reputation of the bank. However, the interpretation of how the recording can meet the goal of compliance varied and this led to variations in the actualisation to the point where some individuals and teams intentionally avoided recording some communications. Some of them believed that as long as the requirements for the final agreement are well documented, it was not important to also record how the team has arrived at these requirements. Others emphasised the importance of the communication trail to provide evidence of the rigour of the process, to facilitate all team members in ensuring the quality of the final document and to contribute to organisational memory. These varied interpretations demonstrate that even when business goals are well communicated, individuals and teams perceive the goals and their importance based on what constitutes sufficiency in meeting the goal and the target consumer of the outcome (e.g. auditors vs team members).

Personal values and goals also influence affordance actualisations. Where use is voluntary, individuals seek to actualise affordances that will support their broader goals and if use is mandatory, individuals interpret how affordances should be actualised to align with their goals. For example, individuals who perceived the potential of prior cases for reuse and learning discussed their desire “to progress their careers” or to “always do the best they can”. Others admitted that when they complete sections of the credit document they are aware that they are not providing all that is required but aim to do it as fast as possible and hope that the approver will not notice. In Bank2 employees in a branch in one of the smaller towns talked about how they see themselves as part of the local community and their goals when they perform their job is to help the community.

This then informs their contributions to the knowledge creation system.

Prior experience with the problem domain can have both enabling and constraining effects. Prior experience with the organisation-specific processes and systems helped individuals to understand what was required in different sections of the document as they understood the underlying risks. Continuous use also creates mental reference models, which allowed some people to spot intuitively “when something is not quite right”. In Bank2, prior knowledge of the bank’s services and tools enabled individuals to contribute ideas and to post responses to requests for help. Furthermore, individuals who lacked good knowledge of services and tools were more likely to ask for help or post ideas that were already implemented. Therefore, in agreement with the literature, human capital is both an input and an outcome of value creation through knowledge management.

Prior experience with other systems in the same bank or other organisations creates prior expectations as to how information should be organised or what features should be there. Prior to the introduction of the system users wrote the documents in Word and they all had set up different templates based on their needs and understanding. The system offers a standard structure representing best practice, which could not match everybody’s model. Users admitted that over time, they have got used to the template and are less annoyed. However, the main issue is with expected but absent affordances caused by prior experience. Users reported that they always notice that the affordances are missing and their frustration grows rather than reducing as nothing has been done to add the missing affordances.

Self-confidence emerged as a common factor in both cases. This includes the individual’s confidence in the ability to use the system correctly but also confidence in their own knowledge and judgement. In Bank2, several individuals said that they only view other people’s posts and vote if they like it. If they do not feel confident that their own ideas are good and “they will be liked” or they are not confident in their knowledge of existing services and are worried that they may propose an idea that already exists. This

demonstrates that self-confidence has affected the actualisation of the posting affordance. Lack of confidence was also evident in individuals' use of "private" posting where the post is only seen by senior management. In this case, the posting affordance is actualised but with a variation which prevents others to collaborate and learn from it. Fear of embarrassment was also mentioned in Bank1 too in the context of not actualising the communication recording affordance "for fear of embarrassing junior staff". Confidence in correcting using the system was mentioned by users in Bank1 in the context of being able to present the information better within the constraints of the ELS design. They related this confidence to perceived lack of aptitude to using technology, which constrained the specific use of the ELS. However, all interviewees explained that longer experience and use of the system improves their confidence and ability to use it. This implies that the constraint of self-confidence has ability and personal self-esteem dimensions. The ability to use technology can be built over time by use and training while lack of confidence in judgement and the subsequent fear of embarrassment requires interventions accommodating these personal attributes.

Another personal attribute emerging as a constraint to the use of the ELS was the personal communication style of individuals. Some users at both junior and senior levels shared that they find it difficult to "discuss" issues online and to understand what others are trying to express as a rationale. As a result, they initiate offline conversations prior to recording. The impact on the recording actualisation is different depending on how the offline conversations are treated. In some of the instances, the offline conversations are used to supplement and support the conversation in order to reach common understanding and then, based on that, the users record the conclusions. However, in some instances the offline conversations replaced completely the online recording. Similarly, a few respondents from Bank2 explained how they talk about their ideas or comments with colleagues in their unit first to help them articulate the main points and then they post them online. This has implications not only for the specific recording affordance but also for the communicating affordances of knowledge management systems.

Finally, lack of interpersonal trust constrained the acceptance and use of prior cases in

Bank1. As there is a great variability in the quality of the submissions, users have been reluctant to use prior cases unless they have been specifically directed to examples, which are judged as excellent by their superiors. A related constraint of lack of trust is the continuous checking and validating of work completed by the facility managers. In the first instance, the constraint leads to reduced breadth of the actualisation of the learning affordance and in the second example, it introduces duplication and loss of value.

Organisational factors:

The previous section demonstrates consistency and convergence in the enabling and constraining conditions at individual level. At the organisational level, the responses from the two banks were very different which may reflect the difference in the context of mandatory vs voluntary use and the difference in complexity of the system design. Overall, the organisational themes were grouped under strategy, incentives, culture and IT alignment.

In both banks, the users overwhelmingly discussed the bank's strategy and the competitive environment the bank operates in. Then they explained how the KMS supports the strategic goals and why it was important. As discussed in the previous section, understanding and alignment with the organisational goals enables affordance actualisations. The clear articulation and communication of the business strategy featured as a common and strong enabler of engagement with the KMS.

The importance of the alignment between personal and organisational goals, and between value creation and value capture was discussed in the previous sections. One approach to align the goals as shown in the literature review is through provision of **incentives**. In Bank2, the use of the KMS was voluntary and there were no tangible rewards associated with any engagement with it. The incentives were reputation-based as expressed in the public acknowledgement of the approval of the idea, the votes from peers and the status points collected for any active engagement i.e. posts and comments. The sample of interviewees included individuals with a wide range of status points from 0 to the highest and they were evenly distributed. Status points were not

recognised by the participants as motivating incentives and were only mentioned in the context of the opportunity to participate in collaborative initiatives where the team members are selected based on their status. This was highly valued by the employees who benefited from the practice but there were very few. The majority of respondents discussed the importance of feedback from senior management as a recognition of their contribution. What stood out in these discussions was that participants felt encouraged to contribute further even when the feedback indicated that the idea would not be implemented. To them it was important that they are heard and that the feedback explains why the idea will or will not be implemented.

The use of the KMS in Bank1 was mandatory and senior managers did not consider it necessary to offer incentives beyond the use of the recorded work for performance measurement. The practice of evaluating the work has had both enabling and constraining effects on the interactions with the KMS. It has encouraged better practice and individuals have reported that they are a lot more careful to include relevant information in the very first draft. Prior to the introduction of the KMS, a draft will be a very rough indication of terms, which led to more iterations and duplication. As some respondents pointed out, the drafts were still tangible and available but not so visible as only their direct superior would see them. With the introduction of the system, each version is recorded and *"the big brother is watching"*. The recorded work has been used to resolve complaints about inferior work and is reviewed during performance appraisal meetings. This use has also acted as a constraint on the use of the system. As junior members are reluctant to record poor work, some of them have offline meetings and conversations to plan and check the work in advance which introduces a hidden cost for the relationship managers. However, most of them commented that the effect over time is positive as the number of offline conversations reduces overtime and the staff get upskilled. The performance element overall is considered encouraging for the creation of good quality documents but constraining for the recording of the collaborative decision making exchanges.

The open culture and flat structure in Bank2 were frequently discussed as enabling

conditions for the contributions of posts. Employees felt safe to post any ideas, criticisms and questions. They were not concerned that they will be judged if they had a “stupid idea” or if the idea already existed. There was greater trust in senior management than in peers, which on the surface appears to contradict the literature. However, further review of the interview data shows that the trust in senior managers is based on familiarity. Senior executives regularly visit all branches and take turns to work as front line staff. Given the distributed structure of the bank, individuals were less familiar with staff in other branches. The effect of the distributed structure on trust was noted in the data of Bank1 as well. Some of the users were not willing to contact individuals in other branches even if they found that they had worked on a similar case as they were not sure how good they were and if they would be willing to help. One person was not even willing to read cases from people they did not know about as this led to lack of trust in the quality of the work.

Top management support in the form of allocation of resources was consistently discussed by the majority of respondents. They talked about the importance of supporting the maintenance of the KMS in terms of required improvements, addressing absent affordances and ensuring the consistency of affordance actualisation over time. For example, with increased use of the KMS at Bank2, there was an increased need for someone to review the posts. However, there was no resource allocated to it, which led to significant backlogs, lack of feedback and some individuals being discouraged from contributing while others kept contributing the same idea. This further emphasised the role of the absent affordance of searching as there were more and more duplications. In Bank1, lack of continuing allocation of resources to fix issues with the system was perceived as lack of support from management. The delay of allocating resources to correct reliability issues led to permanent variations in affordances with many individuals creating copies of work in Word and copying the work in the ELS, which creates duplication, risk of inconsistent data and loss of value. These practices have continued to persist long after the reliability issues were fixed.

Finally, the role of the IT function in the organisation had an enabling effect in Bank2 and

constraining effect in Bank1. In Bank2, the CIO is a member of the senior executive team and participates in the business decision making. All members of the IT team were very aware of the business needs from the KMS and where there is need for further work. Members of staff from all branches knew the CIO and stated that the introduction of the KMS has further improved their perception of the IT department as they can see that they care and respond to the needs of staff and customers. Many of the new products, developed as outcomes of the contributed ideas, were digital products collaboratively created with IT staff. In contrast, the IT department in Bank1 is in a different city from the head office - they have no representation on the executive team and report to the Operations manager. There is lack of alignment between the IT and business in terms of communication, understanding of the strategic goals and subsequently the understanding of the affordances required by users. The IT staff lack empathy towards users and do not understand how the technical issues affect their work and customers. They are aware of the undesirable practices and variations in affordance actualisations resulting from technical issues but do not perceive them as their responsibility. This lack of alignment has led to absent affordances, undesirable variations in affordance actualisations and workaround practices.

6.4 Generative Mechanisms

The data presents a great number of use cases and affordances can be actualised in multiple ways through interaction with different material properties at the individual level. In this section, the specific affordances are aggregated to represent consistent strands of affordances using similar types of process and functional outcomes. The strands are consistent and stable in terms of their functional outcome for the whole organisation. Then they are abstracted to higher level generalised mechanisms which can serve organisational goals. This section considers the generative mechanisms identified in each case organisation and considers how KMS afford possibilities for value creating activities through the generative mechanisms. The mechanisms in both cases are reviewed to find common processes and outcomes to generalise the mechanisms beyond each case and to highlight mechanisms connected to knowledge management systems.

Generalised mechanisms are relatively abstract and unobservable (Wynn and Williams 2012) but their identification is easier based on the concrete concept of the affordance. As suggested by Bygstad (2017), this generalisation needs to focus on the nature of the outcomes in the context of the problem domain and to ensure that the processes generating the outcome are consistent across instances. Each instance will have varied composition of different combinations of affordances but the nature of the activities and their purpose is consistent. In this study, the domain is value creation, the mechanisms were abstracted based on the nature of the value outcome and the affordance components were reviewed to look for consistency.

Knowledge Creation Mechanism:

Considering the knowledge creation mechanism in Bank2 and the knowledge transfer mechanism in Bank1, these two mechanisms afford possibilities to individuals across the organisation to create new knowledge-based outputs for their customers. In Bank2, the outcomes were concepts for products and services and in Bank1 the outcome of the knowledge transfer is a proposal for credit terms for a customer. These outcomes are achieved through contribution of internal and external knowledge from individuals, codification and sharing of the contributed knowledge, and internalisation and application of the knowledge in the context of the specific outcome. The releasing condition is the awareness of a customer need.

Organisational Learning:

The learning mechanism consists of actualised affordances related to context-specific knowledge seeking and knowledge transfer resulting in improved human capital of users including firm-specific and task-specific knowledge, skills and understanding. These include both intentional, unintended, proactive and passive learning. The processes include seeking, viewing and internalising knowledge to improve individual human capital. The releasing condition of all of this is the awareness of a gap in knowledge.

Collaborative Decision Making:

Reflecting the collaborative and context-related nature of knowledge management, the mechanism of collaborative decision making was identified in both banks. The value outcome is an approved and agreed knowledge-based outcome to meet a customer need. The processes include articulating of arguments, providing rationales, suggesting modifications and approving of proposals. They all include input and participation by multiple members and therefore are collaborative in nature. The releasing condition is a proposed knowledge-based concept.

Control and Coordination:

As Grant (1996) proposed, when many individuals collaborate and they may have different goals, ideas and knowledge, there needs to be a mechanism to coordinate them to ensure that they work well together towards the common goal. The processes include planning, organising, allocating duties, monitoring progress. The outcome is efficiency and effectiveness of the process to achieve common goal. The releasing condition is the request for a new task.

In conclusion, this section presents the results of an iterative and creative process of reviewing the mechanisms in both cases based on the value outcomes they generated and the nature of the processes (affordances) they included. The purpose of this abstraction is to propose a set of generalised mechanisms generating value from KMS – knowledge creation, learning, collaborative decision-making, control and coordination. This allows us to contextualise the use and effects of knowledge management system and address the question of how KMS create value.

6.5 Interdependencies

The previous sections have revealed the mechanisms for value creation specific to KMS and contextual factors enabling and constraining the performance of the mechanisms. The affordance concept has allowed the study to provide rich detail on how concrete outcomes are derived from interactions with the KMS. This section presents the findings, which address the final gap in the dynamics of value creation: how do affordances

interplay with other mechanisms and with each other? The literature review on IT value (Nevo & Wade 2010) suggests that there are synergistic relationships between IT and complementary organisational resources. In the context of KMS, authors have argued that value is created through the complementary combination of KMS and human resource development practices (Cohen & Olsen 2015). However, these studies are either conceptual or based on associations and do not elaborate on the interactions and paths leading to these synergistic outcomes.

The analysis of the case data (chapter 4 and 5) illustrate the paired interdependencies between the actualisations of affordances, strands of affordances and organisational mechanisms and complex interplays of paired interactions. These interplays are not static combinations but evolve over time and these results reveal the temporal and emergent nature of the relationships. Furthermore, contrary to propositions in the literature, these interdependencies are not always positive and the outcome of the relationships between mechanisms is not always an improved outcome. This confirms the argument that we cannot always assume best use of resources and complementarities leading to positive convergent results. The relationships between mechanisms (individual affordances, strands of affordances and other mechanisms) were categorised based on 1) whether they are one-directional or mutual and 2) whether the impact on the mechanisms is positive or negative. Based on the data from both cases, the relationships have been categorised and mapped out in a diagram of symbiotic relationships (fig.6.2.). Building on the biological concept of symbiosis, this study defines symbiotic relationships as long-term interactions between mechanisms where the mechanisms can be IT-based or other organisational mechanisms. Symbiotic relationships are based on dependence, not on combination or integration. The dependence can be obligatory, meaning that one mechanism cannot exist without the other, or the dependence can be facultative meaning that the mechanisms can exist independently. This section briefly outlines the categories as manifested in both cases.

A relationship is mutualistic when both mechanisms benefit from it over time, meaning that there is a reciprocal positive impact. In Bank2, an example of a mutualistic relationship is the positive dependence between the knowledge creation and the

implementing mechanisms where the more ideas are implemented, the more people are encouraged to contribute to suggest ideas or work collaboratively on proposed ideas.

A **commensal** relationship exists when one mechanism positively depends on another and the second mechanisms neither benefits nor is harmed from the relationship. This one-direction relationship can be obligatory or facultative. As affordances form strands, some of them cannot exist without another. Collaborative decision making in the context of Bank1 is dependent on the knowledge creation mechanism as evaluation and approval of terms cannot occur without the existence of proposing terms. Improvement in one mechanism does not have to be represented by growth in quantity. The improvement in the quality of one mechanism can led to improvements in the quality or growth of another mechanism. For example, greater quality in the actualisation of the recording affordance leads to greater quality of monitoring. Similarly, the improvement in the quality of training led to improvement in knowledge creation over time.

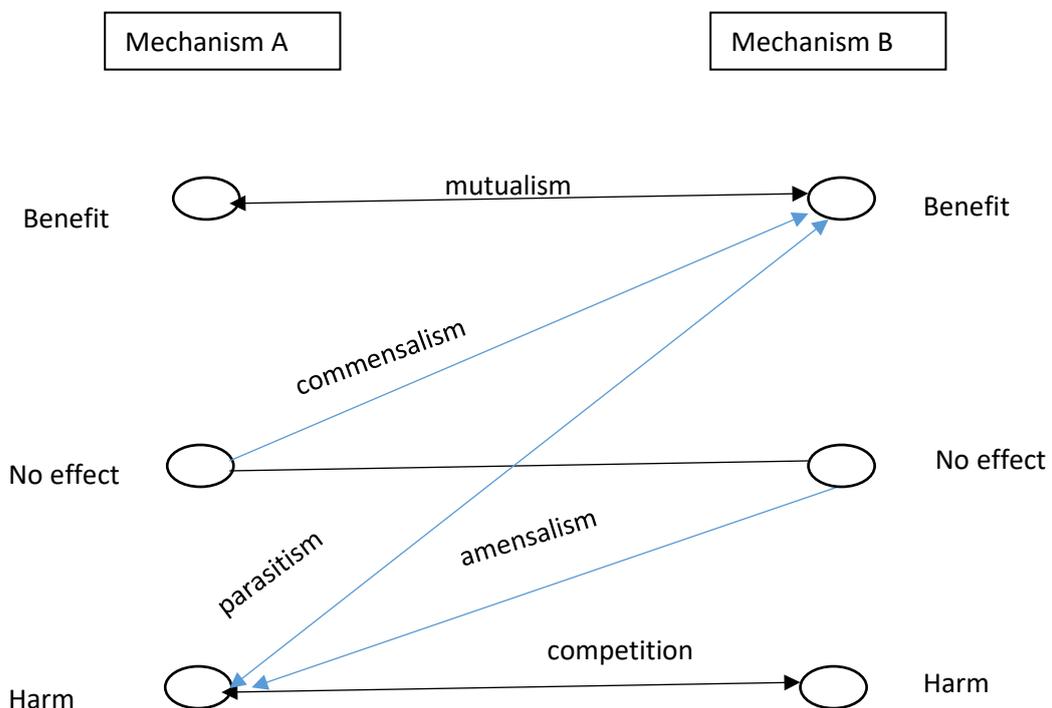


Figure 6.2. Symbiotic Relationships

Relationships that benefit one mechanism but harm the other are called parasitic. The learning mechanisms in Bank1 have negatively influenced the reworking affordance. Reworking includes making changes to the terms in response to requests from the approvers. Individuals have reported that reworking is one mechanism that supports their learning as they gain more experience and learn from their mistakes. Over time, learning harms reworking but reworking is one way to support and benefit learning.

An inhibiting or amensal relationship exists where the interactions between two mechanisms have a negative impact on one mechanism but no impact on the other. For example, improvements in the performance of the updating mechanism of the core IT at Bank1 leads to reduction of the duplicating data entry as the automatically generated data is correct and there is no need for an alternative data entry.

Finally, a competing relationship between two mechanisms exists when they depend on a common resource which is limited. Therefore, the negative relationship is reciprocal as the existence of A harms mechanism B and vice versa. This is very well illustrated by the dynamics of the approving and notifying affordances at Bank2. The resource required for both of these mechanisms is the time of the senior executives who review proposed ideas and put them forward for implementation. They are also the people who notify the contributors about the outcome of the evaluations. Their time is limited as these duties have been added to their full time workloads. Both the notification affordance and the approving mechanism depend on this resource. The case data shows that as the contributions increased, executives prioritised the approving as that results in a value outcome and closure. However, as they stopped providing feedback and notifications this led to frustrations and demotivation of users. To correct that, executives prioritised clearing up the backlog for feedback but then this slowed down the evaluation and approving of ideas. Ultimately, both mechanisms are harmed by the competition.

The symbiotic relationships described above formed persistent patterns of interplay between mechanisms in both cases. They suggest that knowledge management systems can be viewed as elements of an ecosystem where generative mechanisms interact and co-evolve to create or destroy value.

6.6 Conclusion

This chapter integrates the data from both cases and provides a synthesis aiming to address the gaps identified in the literature review. First, the immediate concrete outcomes and the associated instances of value outcomes were reviewed and categorised into a taxonomy based on their level and nature. The findings provide concrete evidence that knowledge management system contribute to tangible and intangible value at individual, process and organisational level. Improvement in productivity featured at all levels. However, contrary to many of the conceptualisations in the literature including financial performance, the majority of the external value instances at organisational level were intangible. This provides a possible explanation why prior studies did not find significant relationships between KMS and organisational performance. The organisational level values were closely related to the organisational goals and the intermediate intangible values were closely related to the type and goals of the system implementation, providing support for the argument in the IS value literature to disaggregate the IS resource.

Value at the individual level was associated with the development of human and social capital and improvement in job satisfaction measures. These were unplanned and unexpected outcomes, largely achieved through unintended actualisations of the knowledge management systems motivated by proactive learning goals of individuals. The data demonstrated that knowledge is a very valuable asset for individuals and organisations. However, the data indicates that the value is realised only when it is internalised and applied. Therefore, the knowledge capital needs to be relational to the context of the firm, task and the individual.

The second major gap in the literature related to the lack of understanding of how and why value is created and destroyed. The affordance approach has provided a rich picture of the ways that contextual individual and organisational factors influence the variation in the depth and breadth of affordance actualisations. The degree of affordance actualisation has an impact on the value generated at the organisational level with

variations of actualisations leading to destroying of potential value. Absent affordances is also a strong theme associated with value destroying activities. Value destroying activities have not been considered in the IS and KMS literature. However, their presence can negate the outcomes of value creating activities and influence the perception of the value of KMS.

This chapter provides further elaboration on how value is created by proposing four generative mechanisms associated with KMS value creation. The mechanisms were derived after review of the composition and functional outcomes of the generalised mechanisms identified by the within case analysis of both banks. The resulting mechanisms are knowledge creation, organisational learning, collaborative decision making, control and coordination.

Finally, the data was aggregated to review the interdependencies of generative mechanisms to address the call from researchers to investigate the potential complementarities and synergies between IT and other organisational capabilities. Based on the data analysis, this study proposes a theory of symbiotic relationships for value creation. The concept of symbiosis represents the data findings as it is based on the concept of dependence and the revealed not only positive but negative interdependencies as well. The dependence can be obligatory or facultative and can flow in one or both directions. The symbiotic relationships formed persistent patterns of interplay between various IT-based and other organisational mechanism.

Chapter 7 Conclusions

The starting motivation for this study is the seemingly conflicting position on the role of IT-based knowledge management initiatives. KM Australia posted a question on LinkedIn a few years ago asking if there is future for knowledge management. Thomas Davenport who is one of the founders of knowledge management suggested that if KM is not dead than it is “gasping for breath” (Davenport 2015). At the same time, investments in KM technology are growing and companies are ranking knowledge management as one of their most important technologies and experts believe that it contributes to profitability (TSIA 2017, Heisig 2016). The academic literature also presents us with conflicting views and results. Research on IT-based KM (KMIT) and its impact is very scarce and the results are inconclusive ranging from treating KMIT as an expenditure (Andreeva & Kianto 2012), or associating it with codification (Lee & Choi 2003) or affecting only intangible value (Cohen & Olsen 2015).

The review of the literature identified a number of gaps in our knowledge of the value that KMIT contributes to organisations and how this value is created. First, the conceptualisation of value is limited to organisational performance and neglects intermediate and intangible external values as well as value at process and individual levels. Second, studies have aggregated the KMIT artefact at the organisational level combining different systems, infrastructure and support in one construct. It is unreasonable to expect that this artefact would be homogenous and all of its aspects would affect organisational performance in the same way. Third, pursuing the measurement of the impact of KMS on performance has not addressed the question of how and why value is created by KMS. This is also a gap in the general IS literature and despite calls for addressing these important questions, value creation is still presented as black box. Studies suggest that there are complementarities between KMIT and human resource development capability but it is not clear how they interact to create value.

This study has applied the critical realist approach to address the gaps in research and identify a set of mechanisms to explain value creation in the KMS context. To further

elaborate on the dynamics of value creation and enable the development of a mid-range theory the study employs the affordance lens to provide a rich picture of the building blocks of the mechanisms associated with value creation and the interplay between the IT-based and other organisational mechanisms. This section summarises the findings and discusses how the study has addressed the gaps in our knowledge to contribute to theory and practice. This is followed by an acknowledgement of the limitations inherent to the research method and the selected context. The chapter and the thesis conclude with final remarks about how this study extends our understanding of value creation and how the subject can be developed further by future research.

7.1. Contributions to Theory

This study contributes to knowledge in two significant ways. First, it extends our understanding of the concept of value with particular emphasis on the value of knowledge at the micro and macro levels. The thesis presents an instantiated value taxonomy and proposes a multilevel value interaction model introducing the concept of value capture. Second, the study has addressed the main research question of how and why KMS create value identifying four high level generative mechanisms and reveals the dynamic nature of value creation and the symbiotic patterns of interplay between IT and organisational mechanisms. The study also reveals how KMS destroy value through inconsistent actualisation of the affordances, absent affordances and harmful interdependences between generative mechanisms. The contributions to knowledge are presented in categories addressing the main gaps in knowledge – what constitutes value in the context of KMS, how and why KMS create value in terms of generative mechanisms, their composition and interdependencies and contextual factors that enable and constrain the performance of the mechanisms.

7.1.1. Value

The data on the instances of value clearly demonstrates that KMS are a source of value creation for organisations and that different KMS create different forms of value, closely related to the organisational goals. This evidence sheds light on some of the issues raised in the literature such as mixed results and lack of significance in relationships with external financial performance. The majority of the external organisational values

reported were not tangible in this case and they were not intended to be. The external values were measured by improvements in customer service, competitiveness and innovativeness and most of these values were planned. However, there were a number of planned and unplanned internal organisational tangible and intangible values, and the majority of the process level values were tangible.

The purpose of this study is not to reject or confirm existing models but rather to explain why there are conflicting results. Reconciling these results with the majority of the literature sheds light on the mixed results in empirical studies. The majority of studies represent value as perceived external financial performance. In contrast, based on the case studies the respondents stated that there is no increased revenue or profitability according to them. Prior literature considered customer service dimensions as intermediate value, which fits with the results in this case. The cases further show that the value outcomes were well aligned with the original goals of the organisation, the nature of the industry (e.g. service-oriented, level of competitiveness) and the individual goals. The intermediate intangible values were also dependent on the type of system. For example, the knowledge creation system produced innovativeness value while the lending system was aimed at process support so there was no element of innovation expected or achieved. This demonstrates the importance of the disaggregation of the KMS resource to produce meaningful and consistent results.

The data traced the value relationships from the individual to the organisational level and the relationships are largely positive but not linear and one-directional. Organisational values were achieved when they were aligned with the individual level value. The immediate concrete outcomes resulting from the affordance actualisations do not always hold a realised value. For example, in the case of the knowledge creation system at Bank2 the immediate concrete outcomes were concepts of processes or products (e.g. scenario 2) and required the performance of organisational mechanisms to realise the value. This explains the issues with the attribution of value reported in the literature. The immediate concrete outcomes provide the bridge to higher level values.

There were a number of unanticipated outcomes at all levels from the use of the KMS in

both banks. At the individual level, both banks reported the generation of human and social capital which was highly valued by individual employees. These were outcomes from emergent and unplanned uses of the KMS. As a result of this emergent nature and the silo structure particularly in Bank1, there was lack of awareness of this value outcome in some units and at some hierarchical levels of the organisation. Bank2 has a relatively flat structure and the learning element through questions was transparent to all as they are visible. However, learning from “watching” was not as consistent and senior staff were not aware of the existence of this value. This has implications for the diffusion of the value realisation across the organisation and for the overall perception of the value of the KMS. If some people are not aware of these positive results, then to them they do not exist. At the organisational level, the unanticipated outcomes were the reduction in training costs and the increase in employee satisfaction. In Bank1, the development of a learning capability, business continuity, sustainability and personalised recommending were unexpected. The use of the system to develop new business through the personalised recommendations was isolated to one of the units and even though the value of new business contributes at the organisational level, it was an outcome only for that team. Again, these unexpected outcomes were not immediately present after the introduction of the system. This introduces a temporal dimension to value and has implications for study results of newly implemented systems.

Finally, it is interesting to note that human and social capital and other knowledge outcomes were uniformly reported by all even though they were not planned for either of the KMS. This confirms the ideas suggested in the literature that KMS are unique in their deployment and generation of knowledge stocks. Individuals needed knowledge as input and they captured knowledge value outcomes. The results also demonstrate that these knowledge stocks are not static and are continuously renewable. As Chapter 2 outlined, the theme of the value of knowledge has been and still is the subject of debates as there are arguments that factual knowledge (true belief) or explicit knowledge do not have value unless they are protected by copyright (Lepak et al 2007). The premise that only tacit knowledge has value has led some authors to assume that IT-based KM initiatives cannot generate value unless they connect people to people. The findings of this study lead to conclusions closer to Kvanvig’s proposition that it is not knowledge but

understanding that has distinct value (Kvanvig 2003). Interviewees consistently discussed the value of the knowledge they acquired which is not only relational to the context of the company and the tasks but also relational to their existing knowledge and understanding. They explained that they valued not simply know-how providing instructions on application as this was available in the form of manuals and instructions but the deeper knowledge closely connected to the performance of the task which develops into an internalised skill-based knowledge.

7.1.2. Value Creation

The main research direction of this study was to open up the black box of value creation positioned between the KMIT resource and organisational value outcomes. To explain the phenomenon of value creation the study adopted the critical realist approach to develop theoretical description of the generative mechanisms resulting in value creation. However, one of the issues with high-level generalizable mechanisms is that they do not reveal how they realise the effect. The affordance approach enabled the study of interactions at micro and macro levels and, to identify the building blocks of the mechanisms generating value. Observed affordance actualisations uncovered finer detail of the interaction between the structure, function and identity. Each affordance actualisation provided evidence of a value outcome directly generated through the interaction with the KMS, the releasing and constraining conditions including interactions with other IT affordances and organisational mechanisms. It uncovered unexpected actualisations generating human and social capital stocks at individual and organisational level. It also uncovered that variations of actualisations reducing the breadth and depth affordance actualisation led to unexpected and undesirable value destroying activities. This study identifies and provides evidence of absences as causes in the form of absent or phantom affordances. These affordances are missing from the KMS but the individual users expect them to be there, described in detail how they would work if present. Absent affordances produced negative outcomes both at the individual and organisational levels and are elements of value destroying activities.

When the goals for affordance actualisation are consistent within a group or at the organisational level, organisational affordances emerge (Volkoff & Strong 2013). This

study identified organisational affordances as building blocks of higher level generative mechanisms. The data showed that the composition of the mechanisms varies dependent on specific actualisations but the outcomes and the underlying process were consistent. The ability to review their composition at a finer level of granularity allowed the researcher to aggregate the data from both cases and, based on the integrated analysis, to propose four generative mechanisms of KMS value creation – knowledge creation, organisational learning, collaborative decision making and control and coordination.

The knowledge creation mechanism affords the creation of knowledge-based output for customers. These outcomes are achieved through contribution of internal and external knowledge from individuals, codification and sharing of the contributed knowledge, and internalisation and application of the knowledge in the context of the specific outcome. The releasing condition is the awareness of a customer need.

The organisational learning mechanism consists of actualised affordances related to context-specific knowledge seeking and knowledge transfer resulting in improved human capital of users including firm-specific and task-specific knowledge, skills and understanding. These include both intentional, unintended, proactive and passive learning. The processes include seeking, viewing and internalising knowledge to improve individual human capital. The releasing condition of all of this is the awareness of a gap in knowledge.

The collaborative decision making mechanism demonstrates how the KMS allows users to jointly evaluate, modify and approve proposed knowledge-based outcome to meet a customer need. The processes include articulating of arguments, providing rationales, suggesting modifications and approving of proposals. They all include input and participation by multiple members and therefore are collaborative in nature. The releasing condition is a proposed knowledge-based concept.

The control and coordination mechanisms supported the planning, resource allocation, coordinating and monitoring. As Grant (1996) proposed when many individuals

collaborate and they may have different goals, ideas and knowledge, there needs to be a mechanism to coordinate them to ensure that they work well together towards the common goal. The processes include planning, organising, allocating duties, monitoring progress. The outcome is efficiency and effectiveness of the process to achieve common goal. The releasing condition is the request for a new task.

Finally, the analysis of the case data revealed the interdependencies between generative mechanisms addressing the call from researchers to investigate the potential complementarities and synergies between IT and other organisational capabilities. The findings confirmed that in some situations the mechanisms benefit from the interaction and result in improvement of the joint outcome. It was surprising however that contrary to the arguments proposed in the literature, interdependencies are not always beneficial for the mechanisms and the outcome. The interdependencies manifested as symbiotic relationships of co-dependence where the interaction between the mechanisms can be either beneficial or harmful to one or both of the mechanisms and can result in value gains or losses. Based on the data analysis, this study proposes a theory of symbiotic relationships for value creation. The dependence can be obligatory or facultative and can flow in one or both directions. The symbiotic relationships formed persistent patterns of interplay between various IT-based and other organisational mechanism. This study proposes the framework of symbiotic relationships including mutualism, commensalism, parasitism, amensalism and competition. The patterns formed and evolved over time, which demonstrated the diachronic nature of the mechanisms.

7.1.3. Contextual Factors

The study of the affordance actualisations and the interdependencies of mechanisms uncovered the enabling and constraining conditions related to the individual user, and the interaction with organisational structures and mechanisms. These conditions affected the depth and breadth of actualisations and subsequently the value outcomes at micro and macro levels.

At the organisational level, the data confirmed factors investigated in the literature such as culture, structure, and top management support. Clear strategic direction and its

communication featured strongly in the interviews as a positive influence helping employees to understand the impact of their system use. The role of the IT function in the organisation and IT alignment also had a strong positive influence on the depth and breadth of actualisations. The lack of alignment in Bank1 led to undesirable actualisations and outcomes, which persisted even after the objective technical issue was resolved.

At the individual level, some of the identified factors were also expected based on the literature. Individuals were encouraged by recognition of their effort, the perceived impact of their actions, self-efficacy and trust. Unsurprisingly given the goal-oriented nature of actualisations, the alignment between the individual and organisational goals was also very important. An unexpected factor motivating individuals to engage with the system was feedback from superiors. In both cases users stated that feedback even when it is not positive motivates them to contribute and engage with the system. Prior experience has both positive and negative influence. Prior experience enabled the depth of actualisation but had a negative influence in setting up expectations of absent affordances.

7.2. Contributions to Practice

As William and Wynn (2018) argue, the research questions and the causal explanations as the basis of theories make critical realist studies more recognisable and useful to practitioners. The statements describing mechanisms including affordances consist of sufficient detail to allow practitioners to identify causal structures and environmental conditions relevant to their context. Therefore, one contribution to practice lies in the applied methodology which makes the results more approachable to practitioners. Delivery of value from investments is relevant to all companies and this study contributes to practice by explaining how value is generated from knowledge management systems. Revealing the causal structures of value creation based on the empirical evidence can help practitioners to create enabling organisational conditions, and select or design KMS to ensure positive value outcomes. This section will outline specific implications of the findings from the study.

7.2.1. Value

The identification of value categories highlights to practitioners the importance of internal and intangible values. It provides them with a comprehensive taxonomy, which is easy to use. It can guide the evaluation of knowledge management systems during the selection, analysis or after implementation to consider intangible value outcomes. For example, human capital was a very strongly manifested value in both cases but it is not normally considered in IS evaluations. It was certainly not part of the evaluation in the case organisations studied by this research. In Bank1 the requests for help were obvious and therefore the executives were aware that some individual users benefited from the practice but at the organisational level they associated it with savings in training costs. This was not completely correct as the users reported that receiving help led to better service to customers. The executives were also not aware that the “watching practice”, where users logged in to read posts, led to their improved knowledge of services and tools and subsequently improved the quality of their work.

As part of the study agreement, a brief report of “best practices” and resulting outcomes was provided to senior managers at Bank1. The information was aggregated to organisational level and could not identify individuals’ positions, names or any other personal information. Some of the senior managers were pleasantly surprised by the practice of review of prior cases for learning purposes. This demonstrates the relevance and importance of identification of unexpected outcomes. As this practice was not prescribed, managers were not aware of it and the value generated for the organisation. As there were also many undesirable and unexpected outcomes, the implication of the findings is that post-implementation reviews based on actual practices can identify issues that lead to loss of value. Many of the unexpected value outcomes also were not present in the first year after the implementation. The study demonstrates the temporal dimension of value creation. This has implications for the perceptions of generated value and suggests that post-implementation reviews need to be timed appropriately to ensure that they can capture realised value.

Finally, the value interaction model and the concept of value capture have implications

for allocation of resources and rewarding individuals contributing to value creation. The case data showed that the individuals, who contributed most to the value outcome of the affordance actualisation, did not capture any value back. In fact, in some cases they lost value as they had to expend time for the actualisation in addition to their regular duties. In the long term, this is not a sustainable situation and over time, they reduced their involvement, which also reduces the value for the organisation.

7.2.2. Value creation

The affordance actualisations and the higher level value creation mechanisms can contribute to practice by identifying desirable affordances. This can inform the design or selection of knowledge management systems. It also demonstrates how organisations can generate value from knowledge management systems. It provides specific mechanisms that can be activated to ensure the value generation.

This study also introduced the concept of value destroying activities and the data demonstrated that knowledge management systems can destroy value through inappropriate and inconsistent actualisations and absent affordances. The case evidence demonstrated that when the breadth or depth of actualisation are reduced, then there is also loss of value. Absences as causes has not been empirically studied in the IS literature. This study shows that absent or phantom affordances have as much causal power as present affordances. The implication for practice is that IT support staff need to be able to identify and correct absent affordances to prevent loss of value.

Finally, the concept of affordance actualisation facilitates the identification of best practices and can be used as clear examples to ensure the consistency of actualisation across the organisation. Affordance actualisation descriptions are not simply examples of use of a KMS; they offer additional contextual knowledge such as the goal orientation of the user, the releasing and constraining conditions, and the immediate concrete outcome. This is a more powerful communication opportunity than a demonstration of correct use of tools.

7.2.3. Contextual factors

As stated earlier, knowledge resides in people and the case data shows that even with the most prescribed and mandatory KMS use, there is always an element of voluntariness in terms of how an affordance is actualised or how the user sees it's potential. Organisations need to provide enabling environments supportive of deep actualisation of KMS affordances. The contextual factors identified in this study can inform the design of the organisational environment to target factors at both micro and macro levels. For example, at micro level individuals were motivated by their confidence in their ability to use the KMS. At the macro level, an enabling condition targeting improvements in individuals' confidence will training practices. Similarly, most respondents perceived feedback as an enabling and motivating factor. The corresponding macro condition would be the establishment of a feedback process to ensure regular input.

7.3. Limitations of the research

Critical realist studies by their nature do not aim to achieve generalisation of findings from a sample to a larger sample. They focus on complex phenomena and their organisational, industry, regional and cultural setting. Generalisability in the context of critical realism is about providing a means in the forms of statements of mechanisms, which can be used in a different setting to explain similar or different outcomes. There is no expectation of prediction and achieving similar results (Wynn & Williams 2012). Validation in the context of critical realism consists of using mechanisms to explain a different set of events and this validates and refines the causal structures and the interplay of mechanisms and context. The generalisation in critical realist studies is generalisation to theory and not generalisation to population. This is a limitation inherent to the method. To support the needs of this method, this study was also limited in context as it relies on two intensive large cases within the same industry and national culture.

Wynn and Williams (2012) recommend triangulation of investigators to control for the influence of biases in the data collection and analysis. With the exception of double

coding of a random selection of data, this study has been conducted entirely by a single investigator and this introduces a limitation. It has been mitigated by triangulation of the data sources.

Affordances exist in the domain of the real, and critical realist studies only identify affordances that have been actualised and observed. Therefore, there is always the possibility that some real affordances were not identified. However, this limitation has been mitigated by a large number of respondents and use case scenarios (Bygstad et al. 2017). This ensures that there is sufficient data to provide a core for a good explanation. This study may not have identified all the mechanisms for value generation but has uncovered relevant mechanisms.

Finally, due to the emergent and temporal properties of mechanisms, it is recommended to conduct longitudinal studies. For example, Bygstad (2010) collected data over 5 years. Due to the time and access constraint, data was collected in Bank1 over a year and half and only for 6 months in Bank2. This introduces a limitation of the project data.

7.4. Conclusions and future research

Knowledge management systems (KMS) support the acquisition, codification, transfer and application of organisational knowledge as part of KM initiatives to generate organisational value. Current research on value of IT-based knowledge management is still emergent and focuses on the assessment of the impact of KMS on organisational performance. The results are conflicting and inconclusive and do not explain how and why KMS generate value for organisations. To address this question, the study utilises a critical realist approach to conduct two in-depth case studies of large financial institutions that have implemented knowledge management systems. Drawing on the concept of affordance as an analytical construct, the study identified generative mechanisms for value creation from KMS. This study extends our understanding of the concept of value with particular emphasis on the value of knowledge at the micro and macro levels. The thesis presents an instantiated value taxonomy and proposes a multilevel value interaction model introducing the concept of value capture. The study

has addressed the main research question of how and why KMS create value identifying four high level generative mechanisms and reveals the dynamic nature of value creation and the symbiotic patterns of interplay between IT and organisational mechanisms. The results also reveal how KMS destroy value through inconsistent actualisation of the affordances, absent affordances, and harmful interdependences between generative mechanisms.

The findings of this study open up opportunities for further research in several directions. The conceptualisation of value can inform positivist research and test the relationships between a specific KMIT artefact and different levels of value. The models can incorporate the concept of value capture. Similarly, the contextual factors can be incorporated in existing models of impact of KMS.

The proposed generative mechanisms of learning, knowledge creation, control and coordination and collaborative decision making can be used in a different context to generalise to theory and refine them. Finally, the theory of symbiotic relationships can be applied to study other generative mechanisms to improve understanding of interdependencies in different contexts.

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Appendix 1 Information Sheet

College of Business and Economics

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Subject line: Invitation to Participate in a Research Study

Dear Name of Participant

Thank you for considering participating in this research project. The aim of the project is to explore what value is generated by knowledge management initiatives and how this value is created. The project has been reviewed and approved by the Department of Accounting and Information Systems at the University of Canterbury.

If you agree to participate in this project, you will be asked to share your experiences in using the “Name of KM system” and your perception and opinions on its impact on the organisation. The interview will take approximately hour and half and will be audio recorded. Names and other personal demographics information will not be collected or recorded. I will provide each participant with their individual interview transcript for their approval. Participation in this project is voluntary and participants can withdraw from the study at any point.

When the project is completed, your organisation will receive a summary report outlining best practices in utilizing the “Name of the System” and categories of value generated from this use.

If you have any further questions or comments related to this email please do not hesitate to contact me. If you are willing to participate in this study please contact me to arrange an appointment.

Nelly Todorova

Appendix 2 Interview Schedule

1. Descriptive

Role in the organization, duration of using the system, experience in the organisation, how they use the system as part of their role, description of how the system was introduced.

2. Context/example

Think of a positive experience with the KM system. Can you describe the situation (purpose, how you have used it, what did it enable you to do, what was the outcome).

For people who have been with the organisation before the implementation as a follow up– how has the example changed since the introduction?

Probe – based on the example, lead on to more examples.

Probe- if appropriate, ask the interviewee to show use for illustration of important points.

3. Resources

What resources were required, what resources were created.

4. Capabilities

Thinking back to your example, what has this use of the system enabled the organization to do.

5. Outcomes

Where do you see the main value of this system? (to yourself, to the organisation)

6. Catch All

If you can have any wishes granted, what would you like to change for the KMS? (probe for examples to get an idea about the reasons behind the wish)