



## IT Risk Management Implementation as Socio-Technical Change: A Process Approach

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# IT Risk Management Implementation as Socio-Technical Change: A Process Approach

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## **Abstract**

This study introduces a new process for implementing risk management in IT departments, promoting a socio-technical change approach. This research steps outside the conventional factor analytic perspective of IT risk management by embedding contextual and processual elements (e.g. socio-technical interactions and interpretations) to explain successful implementations. Adopting a multi-case approach for obtaining richer data from a problem domain, we outline new details of an implementation process. The proposed process model represents how these elements work together to produce a successful outcome. Grounded theory-like analysis of the case findings helped us to understand and explore conceptual categories and themes that are relevant to the proposed process. By developing the conceptual model of IT risk management implementation with a socio-technical perspective, we generate a set of propositions in this paper that explains the dynamic nature of IT implementation.

**Keywords** IT Risk Management Implementation, Process Research, Socio-Technical Change, Interpretive Research.

## 1. Introduction

IT risk management (IT-RM) has become a critical part of standards, regulations, and best practices among IT managers (Jiang and Tornikoski 2019). Although technical factors pose a great threat to the security of an organisation's information and resources, human resource issues in IS development projects, IT outsourcing relationships, data loss security, and cloud computing strategies are often viewed as being a significant security risk (Chen et al. 2019). Hence, IT risks are characterized by heterogeneity and fragmentation (Wiesche et al. 2015) because of they attempt to cover organisational levels from operations to senior management.

In order to deal with these challenges, researchers and IT practitioners develop IT-RM frameworks covering IT-related risks (Cram et al. 2017). Although, the traditional and formal frameworks: ISO 31000, ISACA's COBIT and COSO are explicitly helpful for managing IT risks, many of the behaviours and reactions of IT professionals may lead to an unsuccessful IT-RM implementation (Darwish 2015). Cram et al. (2017) expressed how IT divisions deal with the IT-RM implementation in their workplace. They highlighted a gradual acculturation process through which organisational groups can socially construct meanings, interactions approaches and purposes of their work activities.

In this paper, we build on prior research by exploring a process approach to researching IT-RM implementation that may better facilitate understanding and explanation of this complex and multi-dimensional phenomenon. In this study, outcomes are analysed as the consequence of a sequence of interrelated and interdependent events or instances of social action in organisational processes. In a recent commentary, Chen et al. (2019) pointed out that prior studies of IT-RM are limited in their focus on success factors across multiple levels. We agree with this observation and focus on developing a more detailed and sophisticated understanding of contextual and processual elements including individual actions, socio-technical interactions, and interpretations of IT individuals based on their beliefs, motivations, expectations and values to explain a successful implementation.

The outcome focus of this study is aimed at theory building for describing and explaining IT-RM implementation process. Thereby we outline research questions as such. *RQ1. What are the processes IT individual go through when implementing IT-RM? And RQ2. How can these processes be depicted in a model?* The remainder of this paper is organised as follows. In Section 2, relevant research on theoretical foundations of process thinking, IT-RM and socio-technical change are reviewed. Section 3 develops a conceptual model of IT-RM and considers different aspects of context that are likely to be involved in this process. The research design is presented in Section 4, involving a series of case studies designed around semi-structured in-depth interviews to build a process model. In Section 5, we followed an exploratory research design and applied grounded theory-like (GT-like) techniques to analyse the data collected in six organisations. The paper finishes with a conclusion in Section 6.

## 2. Theoretical Foundations

### 2.1 Process Thinking

Process oriented research involving organisational implementations investigates the nature of the implementation process; how and why implementations emerge, develop, grow, and reinforce. The unit of analysis of process thinking research is the IT-RM implementation process itself. Process thinking places a premium on the temporal sequence of activities in the development and implementation.

Wolfe (1994) described two generations of process theory research. Earlier work is *stage model research*, it conceptualised a phenomenon as a series of stages that unfolded over time. The second *generation of process research*, considers in-depth, longitudinal research fulfilled to explicitly describe the sequences of events, and the conditions which determine implementation processes. This research focuses on theory building and qualitative data collection. These studies tend to be inductive, in-depth, examinations of how implementations develop over time. The form of process modelling adopted in this study is that of Second Generation Process theory, where the objective is to provide a better understanding of how and why the "pieces of the puzzle" interact and work together to produce a successful implementation of IT-RM.

Langley and Truax (1994) identified three classes of process models within the Second Generation of Process Research that seem pertinent to the understanding of IT-RM implementation process. They grouped the various Second Generation Process models into three distinct classes: 'sequential', 'political' and 'serendipitous' models. The first type of model is based on the notion of technology adoption as a sequential implementation process that can be decomposed into a certain number of phases each made

up of different types of activities. The second type of model (the political model) is best illustrated by the importance of managers within an organisation to promote technology adoption. While the focus here is how advocates of new technology (e.g. IT-RM) convince IT individuals to accept their ideas through a process of persuasion (Jiang and Rüling 2019), it is fair to ask to what extent such processes are relevant in organisations. As expressed by Wiesche et al. (2015), the facilitators to successful IT-RM are more likely to individuals own perceptions based on their values, beliefs, needs and motivations, than the organisation's or subgroup's values, beliefs and motivations for adopting IT-RM. However, the influence of social interactions of implementing IT-RM, may well be relevant and therefore conforms well to the process model. Finally, the third class of model (serendipitous model) focusing on a non-deterministic perspective represents a set of processes over a natural course of events that may describe why a new technology as IT-RM is adopted. In this model, the greater the number of routines set in motion such as: contextual conditions, human actions and attitudes and interaction between IT individuals to better understand IT-RM and adopt this new technology.

As a result, it appears that all three models of Second Generation Process Theory are relevant. However, while these models can provide initial constructs, this inductive research attempted to avoid rigidly imposing any particular *a priori* model on the data. Instead, the research adopted a flexible approach that is sensitive the perceptions of the IT individual.

## **2.2 Conceptualising IT Risk Management Implementation**

This paper posits that individual IT department's participation in implementing IT-RM can be understood as a social phenomenon, and therefore a socio-technical perspective is needed, one which pays careful attention to contextual conditions, human actions, interpretations, motivations and their interaction to better understand outcomes. What are the ways we can understand this implementation process, and how can we conceptualise the issues that come into play? How should we study and model IT-RM implementation process in the context of an IT department?

One school of thought mostly influenced by the logical positivist perspective that organisations consider RM process as a black box – an IT artefact (Alhawari et al. 2012). This perspective is less efficient for RM research, and we claim is unable to study different socio-technical process of planning, and organisational and behavioural responses. This perspective of IT-RM is found in many books and journal articles dealing with technical formation issues, and has been identified in previous studies (e.g. Paape and Speklè 2012) as the dominant but limited conceptualisation in the literature to date. Wiesche et al. (2015) argued that these models of IT-RM depict an incomplete representation of reality bearing only tangential reference to the energy and forces of the human agents involved. Essentially, this study posits that the IT-RM process is better represented by a contextual model of social dynamics.

A second school of thought is the change management literature that studies the processes involved in introducing and managing change within an organisation (Jaeger 2018). The research pays careful attention to contextual conditions and individual's own perceptions of IT-RM and their interaction to better understand outcomes. In line with this school of thought is the view that IT-RM is a phenomenon involving the introduction of something new (innovation) to an organisation, either objectively or subjectively perceived to be new. Fundamental to the notion of new technology is the element of change initiated in the material and/or social world as part of a learning which often involves the alteration of relationships and prior ways of doing things.

This research focuses on the implementation process in IT departments as socio-technical change to understand the relationship between IT-RM frameworks (as a technical artefact), and IT individual to eventually achieve the effectiveness of an implementation process. Accordingly, this study conceptualises IT-RM implementation as a dynamic form of socio-technical, multi-dimensional process, in which a development outcome emerges unpredictably from interpretations, perceptions, and reciprocal interactions between IT individuals and technology (IT-RM) within organisations.

## **2.3 IT Risk Management as Socio–Technical Change**

The focus in this study is an 'emergent process' perspective (Markus and Robey, 1988) to consider IT-RM implementation as a dynamic, multi-dimensional process, in which a development outcome emerges unpredictably from individual interpretations and reciprocal interactions between IT individuals and IT-RM frameworks within an IT group context.

Naseer et al. (2016) explained that a socio-technical perspective considers organisational work systems to be facilitated by both technical and social systems. The technical system depends to the technology that is considered to conduct the organisational tasks while the social system refers the individuals who

are responsible for conducting those tasks (Naseer et al. 2016). This research proposes that effective IT-RM can be envisaged as a socio-technical system. For example, Wiesche et al. (2015) believed that IT-RM can be considered to be technologically constructed because they involve the effective and efficient applications of IT resources and formal procedure to support IT strategies and policies; while IT-RM is related to the social system as they include the roles and responsibilities of individuals and willing cooperation of stakeholders to share risk-related knowledge to others (Jaeger 2018).

A framework for understanding IT-RM in IT departments can therefore be built on the interpretations that IT-RM is simply technology implementation. This study thus aggregates technique, interpretations, knowledge, tools and beliefs –*human and non-human resources*– into a single construct – IT-RM. A ‘soft technology’ perspective emphasising the need to focus on individuals’ interpretations of the technology as an important component of the implementation problem (Cram et al. 2017). In support of this argument, Bijker et al. (1987) has identified three layers of meaning of technology: (1) a physical object, for instance, IT artefacts or individual IT departments; (2) activities or processes, such as implementing IT-RM; and (3) technology can refer to what people ‘know’ as well as what people ‘do’. In this context, IT-RM represents aspects of all three dimensions of a social ‘soft’ technology: IT artefacts, implementation process and IT workers.

### 3. A Model for Understanding IT-RM Implementation Process

This section develops a conceptual model for assistance in understanding implementation of IT-RM process, and considers a number of different aspects of context that are likely to be involved in the process. From the socio-technical perspective, it seems reasonable to perceive the concept of IT-RM schemes requires some understanding of IT individual per se and perhaps some interpretation of the assumed link between human (individual IT culture) and non-human (IT artefact) resources.

This research referenced the literature and identified 17 success factors for understanding implementation. These success factors were initially categorised in 15 categories. These categories then formed four main groups of success factors which are: *Personality-based*, *Organisation-based*, *Knowledge-based* and *Calculative-based*. Table 1 illustrates the categories and subcategories of factors. The problem of how these factors intertwine over time and influence an implementation outcome – the process – remains unknown.

Based on the findings of literature review and in line with the data analysis a tentative model can be constructed by grouping the various contextual issues into four distinct, but interrelated categories. It is argued that Personality-based, Organisation-based, Knowledge-based and Calculative-based are needed to build a model of IT-RM implementation. However, what is missing from this model is a description of the dynamics of how these factors interact over time. Table 1 presents the factors that are posited to be linked to the implementation process and their conceptual and/or empirical support in the literature.

There are challenges in developing a new theoretical framework. Most qualitative researchers attempt to avoid prior commitment to theoretical constructs before gathering any data. This study is aimed at theory building, not theory testing, for the purpose of describing and explaining the implementation process. The key outcomes are therefore better understood when situated within four building blocks of theory development. In this regard, the research is guided by the work of Whetten (1989) who proposed that a complete theory must contain four essential elements to studying a research problem may be taken, or combined, which are described in the following paragraphs.

The first building block “what” refers to the factors (variables, constructs, concepts) which should be considered as part of the explanation of the phenomenon under the study. As showed in Table 1, some conceptual and empirical research has provided researchers with a preliminary list of factors believed to be critical to IT-RM. Therefore, one outcome of this research is to identify those factors or issues that are relevant based on literature review from the extant research and the field.

However, the main contributions of this research are situated within the second and third building blocks of theory development. Having identified and classified the relevant factors, elements or issues, the next step in building theory is to determine conceptually “How” and “Why” the elements relate to each other. Prior studies argue implementation cannot be adequately explained by considering or manipulating one or two factors, even though the literature on IT-RM in the past has been influenced by a dominant factor analytical perspective. Rather, a more complex and realistic theory of IT-RM implementation should provide us with a deeper understanding of ‘How and Why’ the separate pieces of the “puzzle” interact and work together to produce a successful implementation. The third building block refers to a theory’s assumptions – that is, the theoretical glue that welds the model together. Answers to the “Why” component push back the boundaries of our knowledge by providing compelling

and logical justifications for altered views. “Only when a researcher can specify his (sic) logic, then he can follow certain rules in determining the propositions he can make about his theory” (Whetten, 1989). In this study, the study proposes to use Second Generation Process Theory (Wolfe, 1994) as a Meta theoretical framework for studying IT-RM implementation.

Socio-technical theory is also used as conceptual lenses for describing and understanding the implementation process. The last building block places limitations on the propositions generated from the theoretical model. Specifically, the “Who”, “Where”, “When” elements set the boundaries of generalisability, and as such establish the range of theory (Whetten 1989). In this regard, the present study goes beyond previous research by attempting to develop an initial set of theoretical propositions regarding the dynamic nature of IT-RM implementation. In this light, the scope of this research is limited to examining processes related to the adoption of IT-RM implementation by IT individuals.

Many writers (Chen et al. 2019; Naseer et al. 2016; Yang et al. 2017) remain dissatisfied with previous work in IT-RM, which they have characterised as inadequate. Secondly, this study argues that researchers have not adequately examined the process issues involved in individual own perceptions and a specific type of IT artefact (IT-RM); that is, the dynamic set of contextual elements interacting with one another over time leading to a successful implementation.

Category	Sub-category	Examples
<b>Personality-based</b>	Transparency	Darwish 2015; De Haes et al. 2017; Mikes and Kaplan 2015; Yang et al. 2017
	Knowledge sharing	Alhawari et al. 2012; Meidell and Kaarbøe 2017
	Experience & skill	Yang et al. 2017
	Communication	Lurtz and Kreutzer 2017
<b>Organisation-based</b>	Managerial direction	Arena et al. 2010; Grace et al. 2015; Meidell and Kaarbøe 2017
	Organisational culture	Chen et al. 2019; Sheedy and Griffin 2018; Yang et al. 2017
	Regulatory frameworks	Mikes and Kaplan 2015; Jiang and Tornikoski 2019
	Management support	Beasley et al. 2015; Wiesche et al. 2015
	Organisation standards	De Haes et al. 2017; Jaeger 2018
	Recognition systems	Wiesche et al. 2015; Jaeger 2018
	Size & complexity	Paape and Speklè 2012
<b>Knowledge-based</b>	Organisational strategy	Beasley et al. 2015; Wiesche et al. 2015
	Training	Sheedy and Griffin 2018; Paape and Speklè 2012
	Organisational capabilities	Alhawari et al. 2012; Yang et al. 2017
<b>Calculative-based</b>	Develop technology	Arena et al. 2010; Themsen and Skærbæk 2018
	Assessment	Beasley et al. 2015
	Auditing	Alhawari et al. 2012

Table 1: Categories and sub-categories of success factors

In order to construct theory, we have to take into account the limitations of the ‘variance’ and ‘process’ approaches to research. This research suggests that a variance or factors perspective does not describe the realities of the IT-RM implementation process and fails to account for effects that are quite specific to the phenomenon under investigation. On the other hand, a process perspective will capture not only the motions or dynamics of IT-RM implementation, but also generate new insights into the significance of different antecedents, particularly those that play a catalytic role – individual IT department. A research design and methods providing 'moving pictures' of process through time are needed.

## 4. Research Design & Methods

This research is a qualitative study with an interpretivist research methodology. Therefore the goal of theory building in the interpretive paradigm is to generate descriptions, insights, and explanations of events so that the system of interpretations and meaning, and the structuring and organising processes are revealed. By adopting an interpretive approach this study construes knowledge as only gained through social constructions such as language, shared meanings, documents, tools; and is a changing and relative phenomenon (Rowlands 2005). Thus, it adopts a combination of case studies and GT-like

techniques as a research method, and socio-technical theory as the research sensitizing concept (Rowlands 2005).

The research design involves three main phases with three different outcomes. In the first phase, a literature review sought to find evidence supporting initial statements addressing the main research questions. Initial statements or tentative theory involving the identified factors in Table 1 are proposed as a result of reviewing the prior studies. In the second phase a multi-case study was employed to understand the implementation process. The qualitative tools referred to in this study include: in-depth interviews, observations, document, and personal experience. In phase three, the interview data was analysed using a GT- like approach to develop a theory on IT-RM process (see Figure 1).

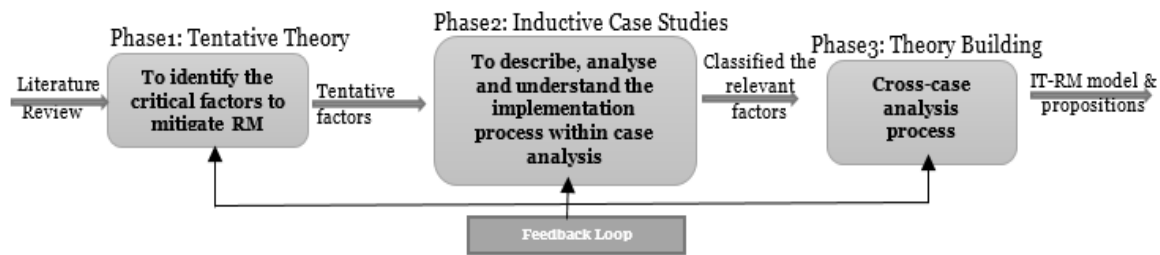


Figure 1: Three Phases of the Research Design

According to Yin (2014), the case study is appropriate when a “how” or “why” research question is being asked about a contemporary set of events, over which the researcher has little or no control. In addition, the case method is well suited to capturing the subjective experiences of IT members and developing theoretical propositions from them. GT-like analysis of the case data produced a structure of conceptual categories and themes related to the implementation process in the context of IT departments. The use of the GT-like approach is particularly appropriate, generating a set of propositions that address the critical elements involved in implementing IT-RM— elements to date overlooked in the literature.

We interviewed 27 IT individuals from six organisations who were either IT managers or participated in the IT-RM process and could therefore provide a thorough perception of the process of IT-RM implementation. We selected cases with a long history of actively engaging in managing IT risk. Case (1) and (5) Consulting: IT risks centre on issues of organizing supply chains, information visibility and privacy. Case (2), (4) and (6) Serving: product data management and retail networks induce IT risks. Case (3) Banking: long-standing IT risks result from regulatory compliance, financial fraud and outsourcing. The data analysis included three steps: 1. early steps in analysis include use of a contact summary form for reviewing the interview, the arranging of data in tables, and the development of a coding scheme. 2. Within case steps involved detailed write-ups for each case assisted by the identification of critical incidents, a time line displaying stages of the process, the development of a logical chain of evidence, and the writing of a narrative story. 3. Cross case analysis involved the search for cross-case patterns by combining information from several cases into a single table. From that, a new set of process-oriented codes were developed, using a form of content analysis known as ‘open coding’ and ‘axial coding’ (Strauss and Corbin 1990).

## 5. Findings

RQ1. What are the processes IT individuals go through when implementing IT-RM? And RQ2. how can these processes be depicted in a model?

In step 3 of Figure 1, this section builds a process model of IT-RM implementation that emerged from the analysis of data. The interviews asked respondents to describe the sequence of events that took place during the implementation. The assumption is that this would reveal a ‘process of IT-RM implementation’. When questioning IT individuals in all cases, it became clearer that different phases occurred, and that there seemed to be a combination of facilitating contextual conditions and individual’s own perceptions of IT-RM and their interaction intertwined over time that lead to a successful implementation. Indeed, between them, the following quotations refer to four different types of steps that occurred in sequence and in parallel.

Firstly, the early step to develop a favorable disposition towards system implementation from participating IT members. It is impossible to participate in IT-RM implementation without preparing (transparency issues) and conceiving of IT individuals. IT-RM implementation was consistent with

some IT groups' values and inconsistent with other IT groups' values, managers could be used to help avoid conflicts between them.

*About this issue, we all know it's a good way of decline uncertainty but an argument can be made that routinely discussing risks would occur more readily in an environment of trust, openness, and free-flowing communication across the organisation (case6).*

*....., practice of communicating is considered effective in risk management if employees feel like to share their experience. Clearly, the influence of risk management was considered to provide additional confidence to communication (case5).*

Secondly, the middle step to develop an appropriate environment to facilitate system implementation from a participating IT member's perspective. However, the requirements for qualified staff, combined with creating motivations and awareness for implementing new technologies as ITRM that came with having a supportive IT manager who the organisation required during implementation.

*We had guidance to help people here, I have been involved in work at all moments. We embed the process within department and are in charge of ensuring participation of members in this implementation (case 3).*

*It was too hard to engage people with this framework; people could not find out how this framework works and how it would set in process. They were interested and were not really motivated to involve with it (case 1).*

And thirdly, a later step concerning inconsistency between the organisational expectations of ITRM and individual beliefs about the ITRM. The IT individual, which developed the ITRM scheme had focussed their energies on modifying and tailoring the ITRM. They developed the scheme to ensure that it was reliable and accurate to apply.

*When compared to other tools, ITRM system allows organisations to be more reliable during the execution of IT projects in their unit and we had worked to adjust it to other systems (case 5).*

*After the careful modification and changes were done on ITRM, we believe in having most efficient system. We spent more time and costs in developing the system to use it and presenting IT members how ITRM can improve efficiency and accurate in their daily operations (case4).*

Finally, a fourth step involved in assessment of the scheme. Assessing and reviewing factors will facilitate IT managers to analyse effective implementation. IT managers are accountable for establishing a holistic ITRM within the organisation. They do so by providing methodological guidance and judging the quality of the implementation of ITRM conducted by employees. However, IT managers review and approve or tailor this process to insure that resources required for implementation are allocated.

*This new concepts is seen as an additional burden. The ITRM forces you to change some routines. If it wouldn't be compulsory on a regular basis, people would do it later or never. But since we force them to do, they often just comply and do what you are asked (case6).*

*Here, the most popular argument is keeping update management: when we need to make some changes in critical times, he will act quickly. It also is useful for predicting events also pull out documents when needed (case 4).*

Although it was tempting conceptually to define the processes associated with these steps as sequential stages, evidence from the data suggests that a better representation of the overall process is as a set of parallel, interconnecting and recursive processes. Combining the interpretations of IT individuals highlights that four sub-processes associated with implementation apparently occur in a recursive manner. The initial cross-case analysis phase labelled these four sub-processes as 'Personality-based' (early), 'Organisation-based' (middle), 'Knowledge-based' (later) and 'Calculative-based' (now) respectively. The sub-processes are interconnecting because the developing IT-RM (knowledge-based phase) and its assessment (calculative-based phase) suggest after preparing people (personality-based phase) that came with having a supportive IT manager who the organisation required during implementation and an appropriate environment (organisation-based phase). Personality-based and organisation-based phase are also parallel rather than strictly sequential because they take place at least partly simultaneously. Knowledge-based and calculative-based phases are also parallel because IT managers require to assess system and its update simultaneously. However, the assessment and updating of calculative-based phase is a continual and iterative process, and occurs at all stages of the



process—*recursive*. While in the model the four dimensions are separated out for analytical convenience, in practice they constitute a mutually interactive, complex socio-technical ensemble.

Figure 2 presents a conceptual model of IT-RM implementation that can be used to inform an analysis of the process. The model synthesises our understanding of IT-RM as an emergent process of socio-technical change (as introduced above and discussed in more detail below). The findings view an organisation as a dynamic system of four interacting elements. Change in one phase leads to implementation change through effects on one or more of the other elements. According to Table 1, we considered the *personality-based phase* derived from transparency (trust, power), knowledge sharing, communication and experience and skill themes. The *organisation-based phase* derives from culture, support, standards, norms, frameworks, recognition systems and size and complexity themes. The *knowledge-based phase* derives from training, develop technology and capabilities; and finally the *calculative-based phase* is comprised of assessment and auditing themes.

Phase 1. *Personality-based* involves the participation of a wider range of IT individual than the user, developer or manager groups in IT departments. Such participants in an IT-RM implementation are knowledgeable actors, who involve in processes of knowledge sharing, sense-making, communication and negotiation in order to construct meaning in relation to the implementation and develop an emergent IT-RM. These IT individual act purposefully within defined roles and relationships during implementations and with differential access to material and non-material resources. Their knowledge, experience, skills, expectations and interests, beliefs also shape their sense-making, and actions.

*.... There is an adage which goes like this "if it's everybody's responsibility, then it's nobody's responsibility". We need to have one person be given responsibility for implementing IT-RM within each department. In this manual we refer to this person as the "risk manager" (case 3).*

Over the last few years, “transparency” theme has become a central topic of study in organisations. It is impossible to participate IT-RM implementation without conceiving of trust among individuals. Indeed, staff must be assured that other individuals do not abuse their knowledge and knowledge sources are reliable and credible. Hence, the improvement of transparency and subjective issues lead to encourage individuals to voluntarily share knowledge and ideas and participate readily and willingly.

*When I need some information- they don't like to answer and said, I am sorry I don't have time for this, I respect them but then I realize it's not time, it's like..... (case1).*

Phase 2. *Organisation-based* refers to the process by which IT managers come to support IT individuals during implementation. Different types of contextual categories assist in explaining how IT managers come to enable individual participation to implementation: culture, support, standards, norms, frameworks, recognition systems and complexity themes. They are considered as valuable issues who enhance responsiveness. People will tend to participate in implementation when they find managers as supportive and interested in improving daily operations. Managers will be able to influence culture through increased awareness and incentives, facilitating the implementations.

*In my opinion IT-RM is a moderator for improving performance, it's our talent to make things easier and help people to do it. We will be a step behind and we should invest an awful lot of effort (case 6).*

*It should be a wonderful idea to ask for developers' feedback on systems, so it can be considered as learning opportunities from their experiences (case4).*

Phase 3. *Knowledge-based* refers to the development process where additional training and modifications to the framework are provided. As reported on before, these activities can be classified according to three different but related themes: training, capabilities and develop technology.

*We invested more time in training them, how to use it and how IT-RM can promote accuracy in their tasks. After a while, we could see that they came back to us and said "it's not really complex" or "how can I get more information about this framework?" that seems to help them and it's really like a wavy motion, once you involve a group of them to use it, the framework gets further promoted by word of mouth (case 2).*

Further, an IT group conducted a series of develop technology as tailoring along with the changes to the system ensured that implementation, which was an efficient to begin with, was further enhanced from a reliability perspective:

*It could be a great idea to ask for individuals' feedback on framework, so it can be considered as learning opportunities. Some people have little motivation to adopt because it wasn't tested well enough! It is very efficient now – the framework now allows us to produce reliable results in quick time (case 4).*

Phase 4. *Calculative-based* focuses on two different themes involving assessment and auditing. Auditing on the implementation of IT-RM would normally be done by a staff member who has the responsibility for assessment. Auditing on IT-RM implementation should be filed and used in regular reviews of procedures. The formal assessment is presented to manager on a regular basis at board meetings to ensure continuity, acknowledgement and a precise evaluation. However, IT managers review and approve this process to ensure resources required for implementation are allocated.

*I check all details to ensure the system is working in the right way. If I can't understand it and need additional details... I will ask people to provide reports by adding more information (case 6).*

However, this phase continues the use of implementation and supports ongoing management activity. It is a process of developing reassessment and updating the framework during implementation. Because of the effectiveness of IT-RM implementation, the focus for many IT individuals moved from supporting and evaluating into monitoring. The focus moved from 'Personality-based, Organisation-based and knowledge-based elements' into 'calculative-based element' that related to auditing and reassessment.

*It's clear, that the present is formed from a past, I mean that the previous IT projects have left their traces on the current IT projects. Documents and reports can help us to implement it (case5).*

Figure 2 presents the resulting research model that details the key elements and identified relationships. The first relationship identified in the case data examines the influence of policy on IT individual and organisational characteristics. It examines the role of standards, guidelines, and regulations in shaping culture, awareness and socioemotional consequences for IT individual, how the policies and decisions influences broadly held beliefs and values related to implement an IT-RM. The second relationship examines the requirement for development. The organisations, which developed ITRM schemes had focussed on modifying and tailoring the IT-RM to be consistent within the organisation. The third explores the extent to which policies and elements aid in achieving IT-RM implementation, how these factors, contextual conditions work together to produce a successful IT-RM implementation.

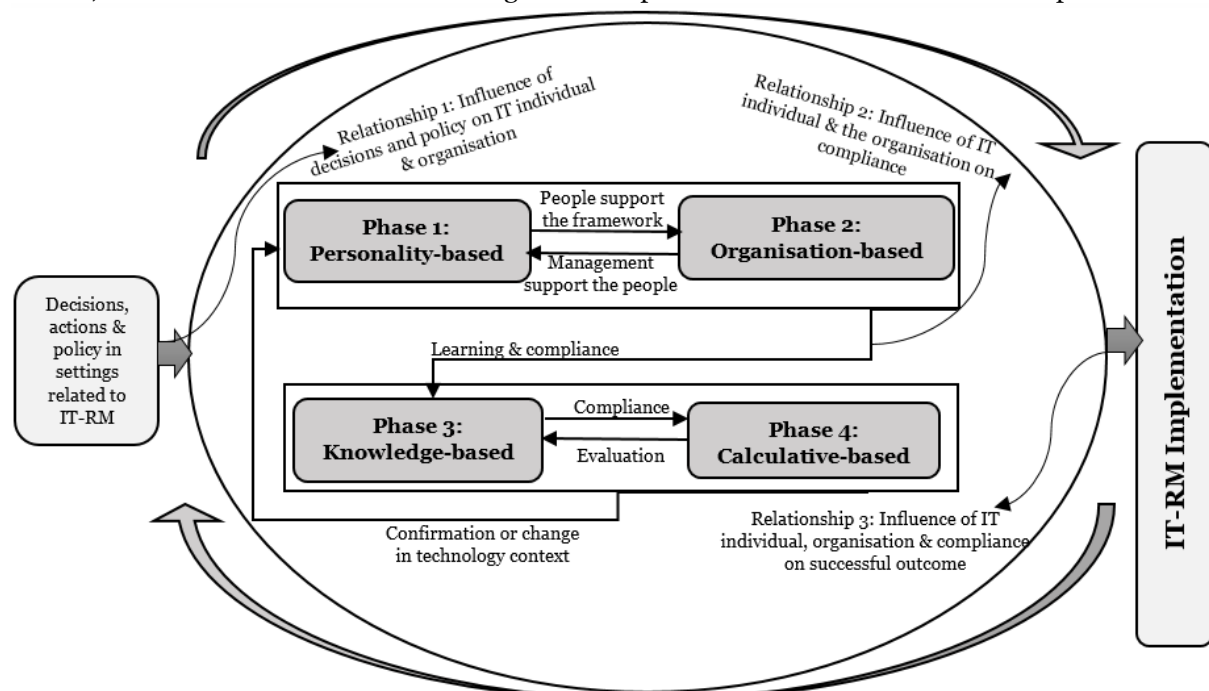


Figure 2: Conceptual model of a successful implementation of IT-RM process.

This paper has explored and developed a process approach to researching IT-RM implementation that may better facilitate understanding and explanation of this socio-technical phenomenon. In this regard,

the present study goes beyond previous research by developing a set of theoretical propositions regarding the dynamic nature of IT-RM implementation. Figure 2 presents the propositions that synthesize our IT-RM theory. However, the four phases – personality-based, organisational-based, knowledge-based and calculative-based – are critical to explain the process of IT-RM implementation.

From a socio-technical perspective, our theory posits that when IT individuals' interpretations of IT-RM implementation practices are inconsistent with IT groups' values and efficient practices (e.g. transparency, communication, experience), the implementation process is hindered (P1); it is facilitated when some IT-RM implementation practices are interpreted as consistent with the values (P2). In this regard, the theory proposes that modifying the IT-RM implementation practices can make the system or the practices consistent with the organisation's fundamental values (P3). However, IT managers review and approve or tailor the system (IT-RM) to insure resources required for implementation are allocated (P4). The paper presents four propositions:

*P1: When some characteristics of IT individual are inconsistent with IT-RM, the implementation process is hindered.*

*P2: When implementation of an IT-RM is considered in an appropriate atmosphere and is consistent with values, the implementation process is facilitated.*

*P3: When IT-RM implementation is inconsistent with values upon which all users reach a consensus, changes (tailoring, modifications) to implement can render them consistent. This facilitates the implementation process.*

*P4: When IT-RM implementation is done, the focus for many IT individuals move from supporting and developing into evaluating and monitoring.*

## 6. Conclusion

The broad objectives of this study were two-fold. The first was to explore, describe, and explain how IT individuals in the field go about forming their opinions and assessments of IT-RM as part of the implementation process. In this regard, we were required to discover and understand the interaction between contextual issues, the IT-RM framework itself, IT individual interpretations towards them, and their effect on implementation. The second objective was to develop a theoretical model for use in guiding the design and analysis of the proposed empirical work. As described in the opening, and in light of the paucity of previous research on the IT-RM implementation, this study provided an alternative perspective (socio-technical and processual) to an emerging research topic. It is argued that without more emphasis on the dynamic nature of the implementation process, an incomplete understanding of the IT-RM implementation will result. The research also argues that due to the stage of knowledge accrual about this problem, more attention should be paid to the development of new models more fully specified through grounded research that are better able to account for the phenomenon under investigation.

The research developed a conceptual model of process that includes four phases to understand the implementation process. Evidence from the data suggests that a better representation of the overall process is as a set of parallel, interconnecting and recursive processes. From a socio-technical perspective, the IT-RM implementation process is facilitated when IT-RM implementation practices are interpreted as consistent with individual's values (e.g. transparency, communication, experience) and organisational values (e.g. culture, management support). In this regard, the theory proposes that modifying and assessment of the IT-RM implementation practices can be made consistent with the organisation's fundamental values.

## 7. References

- Alhawari, S., Karadsheh, L., Talet, A.N. and Mansour, E., 2012. "Knowledge-based risk management framework for IT project," *International Journal of Information Management* (32:1), pp 50-65.
- Arena, M., Arnaboldi, M. and Azzone, G., 2010. "The organisational dynamics of enterprise risk management", *Accounting, Organisations and Society* (35:7), pp 659-675.
- Beasley, M., Branson, B. and Pagach, D., 2015. "An analysis of the maturity and strategic impact of investments in ERM", *Journal of Accounting and Public Policy* (34:3), pp 219-243.
- Bijker, W., Hughes, P., and Pinch, T., (1987). "The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology", *MIT Press, Cambridge Mass.*

- Cram, W.A., Proudfoot, J.G. and D'Arcy, J., 2017. "Organisational information security policies: a review and research framework", *European Journal of Information Systems* (26:6), pp 605-641.
- Chen, J., Jiao, L. and Harrison, G., 2019. "Organisational culture and enterprise risk management: The Australian not-for-profit context", *Australian Journal of Public Administration*.
- Darwish, S. Z. 2015. "Risk and Knowledge in the context of Organisational Risk Management," *European Journal of Business and Management* (7:15).
- De Haes, S., Huygh, T. and Joshi, A., 2017. "Exploring the contemporary state of information technology governance transparency in Belgian firms", *Information Systems Management* (34:1), pp 20-37.
- Jaeger, L., 2018. "Information security awareness: literature review and integrative framework", *In Proceedings of the 51st Hawaii International Conference on System Sciences*.
- Jiang, Y. and Tornikoski, E.T., 2019. "Perceived uncertainty and behavioral logic: Temporality and unanticipated consequences in the new venture creation process", *Journal of Business Venturing*, (34:1), pp 23-40.
- Langley, A. and Truax, J., 1994. "A process study of new technology adoption in smaller manufacturing firms", *Journal of Management Studies* (31:5), pp 619-652.
- Lurtz, K. and Kreutzer, K., 2017. "Entrepreneurial orientation and social venture creation in non-profit organisations: The pivotal role of social risk taking and collaboration", *Non-profit and Voluntary Sector Quarterly* (46:1), pp 92-115.
- Markus, M.L. and Robey, D., 1988. "Information technology and organisational change: causal structure in theory and research", *Management science* (34:5), pp 583-598.
- Meidell, A. and Kaarbøe, K., 2017. "How the enterprise risk management function influences decision-making in the organisation—A field study of a large, global oil and gas company", *The British Accounting Review* (49:1), pp 39-55.
- Mikes, A. and Kaplan, R.S., 2015. "When one size doesn't fit all: Evolving directions in the research and practice of enterprise risk management", *Journal of Applied Corporate Finance* (27:1), pp 37-40.
- Naseer, H., Shanks, G., Ahmad, A. and Maynard, S., 2016. "Enhancing Information Security Risk Management with Security Analytics: A Dynamic Capabilities Perspective", in Proceedings of the 27th International Conference on Information Systems.
- Paape, L. and Speklè, R.F., 2012. "The adoption and design of enterprise risk management practices: An empirical study", *European Accounting Review* (21:3), pp 533-564.
- Rowlands, B.H., 2005. "Grounded in practice: Using interpretive research to build theory", *The Electronic Journal of Business Research Methodology* (3:1), pp 81-92.
- Sheedy, E. and Griffin, B., 2018. "Risk governance, structures, culture, and behavior: A view from the inside", *Corporate Governance: An International Review* (26:1), pp 4-22.
- Strauss, A., and Corbin, J.M. 1990. *Basics of Qualitative Research: Grounded Theory Procedures and Techniques*. Newbury Park, CA: Sage.
- Themsen, T.N. and Skærbæk, P., 2018. "The performativity of risk management frameworks and technologies: The translation of uncertainties into pure and impure risks" *Accounting, Organisations and Society* (67), pp 20-33.
- Whetten, D., (1989), "What Contributes a Theoretical Contribution?" *Academy of Management Review* (14:4), pp 490-495.
- Wiesche, M., Schermann, M. and Krcmar, H. (2015). "Understanding the enabling design of IT risk management processes", in *Proceedings of the 36th International Conference on Information Systems, Fort Worth, TX, USA*.
- Wolfe, R.A., 1994. "Organisational innovation: Review, critique and suggested research directions", *Journal of Management Studies* (31:3), pp 405-431.
- Yang, S.O., Hsu, C., Sarker, S. and Lee, A.S., 2017. "Enabling effective operational risk management in a financial institution", *Journal of Management Information Systems* (34:3), pp 727-753.
- Yin, R. K. 2014. *Case study research: Design and methods*, Sage publications.