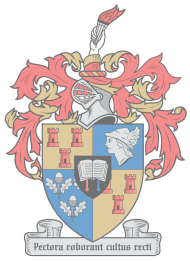
The development of an empirical enterprise risk management values scale accounting for the effect of culture in emerging market managers

Arthur Linke



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Declaration

I, Arthur Linke, declare that the entire body of work contained in this research assignment is my own, original work; that I am the sole author thereof (save to the extent explicitly otherwise stated), that reproduction and publication thereof by Stellenbosch University will not infringe any third-party rights and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

A. Linke March 2018

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Abstract

The purpose of management is to support the organisation in achieving its objectives and increase value. Hereby taking risk represents the essence of business activity, the outcome of which is either value creation or destruction for the organisation. Enterprise Risk Management (ERM) represents a paradigm envisioned to provide a holistic framework for the risk management process, and thereby support the organisation in achieving its objectives, providing both resilience and opportunity for organisations in the face of uncertainty. Recent global financial and economic crises have led both academics and practitioners to identify shortcomings in risk management as one the key causes of these crises As such, the study of ERM is currently high on the business and management sciences' research agenda. One of the key ways of bridging the gap between academia and practice in the business and management sciences domain is development of empirical measurement scales for abstract constructs, such as enterprise risk management values, that measure phenomena incorporating people, practices and organisations.

A review of the relevant literature clearly highlighted the need for a robust academically-validated instrument that will provide an enterprise risk management measurement scale comprising items and constructs that can act as variables for empirical studies. The key contribution of this study is an item-based and empirically developed ERM Values Scale (ERMVS) comprised of manifest variables resulting in a latent variable ERM values construct structure. Utilisation of this scale will ultimately benefit organisations in achieving their objectives and creating value.

The study's methodology was carefully constructed to take into account all the requirements for a robust scale and construct development design, including the reporting of all findings during the process. Firstly, a new theoretical ERM construct domain cutting across various management sciences disciplines and ERM practice was clearly defined – comprised of ERM pillars and a pool of ERM items (manifest variables). A new, empirically-validated ERMVS then resulted out of an ERM expert group review of the ERM item pool, which incorporated intra-class correlation testing to determine content validity of the scale.

The ERMVS was then taken through rigorous empirical reliability and validity testing in two separate samples comprised of risk managers in the telecommunications industry, and members of the Institute of Risk Management of South Africa (IRMSA). Relevant empirical tests used in this process included Cronbach's alpha, exploratory factor analysis and confirmatory factor analysis which included structural equation modelling. A new two-factor model of ERM values (ERMVs), comprised of organic and mechanistic constructs, was determined to be reliable and valid and exhibited goodness of fit on several aspects.

Finally, the ERMVS was tested for the effect of culture in emerging market managers in a cross-validation exercise, whereby the ERMVS' constructs exhibited statistically significant relationships with certain culture values dimensions such as Uncertainty Avoidance (UAI).

Key words

Enterprise risk management

ISO 31000

COSO

Scale and construct development

Organic and mechanistic structures

Expert group

Culture values e.g. Power Distance, Uncertainty Avoidance

Manifest and latent variables

Cronbach's alpha

Intra-class correlation

Exploratory factor analysis

Confirmatory factor analysis

Structural equation model

Goodness of fit

The Institute of Risk Management of South Africa

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List of acronyms and abbreviations

AI	Artificial Intelligence
AIC	Akaike's information criterion
BCM	Business Continuity Management
BIC	Bayesian information criterion
BRICS	Brazil, Russia, India, China and South Africa
C&C	Communication & Consultation
CD	Coefficient of Determination
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CI	Continual Improvement
COL	Collectivisim dimension
COSO	Committee of Sponsoring Organizations of the Treadway Commission
CRO	Chief Risk Officer
CTT	Classical Test Theory
DF	Degrees of Freedom
DMP	Disaster Management Plan
EC	Establish Context
EFA	Exploratory Factor Analysis
EPC	Expected parameter change
ERM	Enterprise Risk Management
ERMI	Enterprise Risk Management Index
ERMVs	Enterprise Risk Management Values
ERMVS	Enterprise Risk Management Values Scale
FD	Framework Design
FM&R	Framework Monitoring and Review
FO	Future Orientation dimension
GLOBE	Global Leadership and Organizational Behavior Effectiveness (programme)
GoF	Goodness of Fit
GRC	Governance Risk & Compliance
HPWS	High-Performance Work System
IBSA	India, Brazil & South Africa
ICC	Intra-class Correlation Coefficient
IDV	Individualism dimension
IoT	Internet of Things
IRM	The Institute of Risk Management
IRMSA	The Institute of Risk Management of South Africa
IRT	Item Response Theory
ISO	International Standards Organization

JSE	Johannesburg Securities Exchange
KPI	Key Performance Indicator
KRI	Key Risk Indicator
LTO	Long-term Orientation dimension
M&C	Mandate & Commitment
MAS	Masculinity/ femininity dimension
MI	Modification Index
MIS	Management Information Systems
ML	Maximum Likelihood
MNC	Multi-national Corporation
MON	Monumentalism dimension
MTN	Mobile Telephony Networks
NC	National Culture
NNFI	Non-Normed Fit Index
OCA	Organizational Culture Assessment
ORSA	Own Risk and Solvency Assessment
PDI	Power Distance dimension
PLS	Partial Least Squares
PM	Project Manager
PO	Performance Orientation dimension
RA	Risk Assessment
RM	Risk Management
RM&R	Risk Monitoring & Review
RMIS	Risk Management Information System
RMSEA	Root Mean Square Error of Approximation
RT	Risk Treatment
S&P	Standard & Poor's
SD	Standard Deviation
SEM	Structural Equation Model
SEOM	Standard Error of the Mean
SRMR	Standardised Root Mean Square Residual
SW	Software
TLI	Tucker-Lewis Index
UAI	Uncertainty Avoidance dimension
UK	United Kingdom
USA	United States of America
VSM-13	Values Survey Module 2013
VUCA	Volatile, Uncertain, Complex and Ambiguous
WEF	World Economic Forum

CHAPTER 1
INTRODUCTION

ERM offers a new domain for management scholarship where management scholars can find interesting and theoretically important questions that also have implications for practice (Bromiley, McShane, Nair & Rustambekov, 2015:273).

1.1 MOTIVATION FOR THE STUDY

The global economy is shifting into the fourth industrial revolution often referred to as Industry 4.0[1], which is characterised by the risk landscape of business management becoming ever more Volatile, Uncertain, Complex and Ambiguous (VUCA)[2]. In the management sciences, the goal of management is to support the organisation in achieving its objectives and increasing its value. Taking risk is a central activity of the organisation, and risk is defined as the "effect of uncertainty on objectives" of an organisation by the International Standards Organization (ISO) 31000 (2009). Risk management is a formalised process meant to both provide resilience and enhanced value creation for organisations in the face of uncertainty. However, global financial and economic crises, such as the most recent 2008-2009 events and the pursuant global recession, have led both academics and practitioners to identify shortcomings in risk management as one the key causes of these crises (Van der Stede, 2011). A relevant observation is that of Lim, Woods, Humphrey and Seow (2017:75-76):

> *Detailed academic studies of [risk management] practice remain rare but are still much needed. The importance of gaining a deeper, institutional level knowledge of risk management practice has been heightened by post-crisis calls for practice improvements that cannot easily be addressed in the absence of such detailed knowledge.*

In addition, increasing global corporate governance regulations, such as the King Codes in South Africa[3], are mandating that risk management becomes embedded in organisations and is comprehensively recounted in integrated reports.

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[1] Klaus Schwab (2016), the head of the World Economic Forum (WEF), published a book on the *Fourth Industrial Revolution.* The topic featured at the WEF's 2016 conference – *Industry 4.0*. It was represented by advances in technology such as Artificial Intelligence (AI), Internet of Things (IoT), robotics, nanotechnology, supercomputing etc.

[2] The phrase VUCA was first used to describe this phenomenon in the military at the end of the Cold War and was most recently popularised in the business and management sciences via a *Harvard Business Review* article as per Bennett and Lemoine (2014).

[3] The relationship between corporate governance and risk management, including the King Codes in South Africa, is discussed in Section 2.6.

Global standards for risk management, such as ISO 31000 (2009) and the Committee of Sponsoring Organizations of the Treadway Commission (COSO) (2004), refer to enterprise risk management (ERM), as the holistic, umbrella form of risk management covering the broad portfolio of risks in an organisation. ERM was defined by Arena, Arnaboldi and Azzone (2010:659) at its most basic level, as an approach seeking "to link risk management with business strategy and objective-setting, entering the domains of control, accountability and decision-making". ERM is thus connected to one of the central themes of the academic field of the business and management sciences, namely the discourse around an organisation achieving its objectives, a key one of which is for the organisation to maximise value (e.g. Drucker 1959). ERM covers all aspects of risk management of the organisation, including finance, operations, human resources, brand and reputation. According to Fraser and Simkins (2010), the vast majority of the global Fortune 500 firms have instituted ERM, including the appointment of a Chief Risk Officer (CRO) to oversee its implementation.

Whilst the need for ERM is clear, and the desire to implement ERM is apparent, the topic was initially relatively under-investigated by academic researchers, in general, and more specifically as relates to measurement scales / indices for ERM that are deeply rooted in theory and empirically sound. The study of ERM in emerging markets is still particularly under-represented, and organisations in these markets may be particularly susceptible to the effects of poor risk management. Academia is now calling for a specific ERM research agenda, which explicitly includes the measurement of ERM in terms of its level of implementation and its effect on the organisation and its performance. The combination of these factors has led to the quote by Bromiley et al. (2015) at the beginning of this introduction, and is the focus of this dissertation, i.e. the design of a study to develop a valid and reliable empirical ERM measurement instrument that contributes to knowledge from both the academic and practice perspectives.

In short, in the academic field of management, management practice is meant to support the organisation in achieving its objectives and creating value. As outlined above, risk management, and specifically ERM, is meant to contribute significantly in this domain. In order to determine whether ERM is in fact providing such a contribution, ERM needs to be measured, and a key building block for this measurement is the values of managers towards ERM. The focus of this dissertation is thus to develop a valid and reliable instrument for measuring ERM in the form of an ERM values scale. As is discussed in detail in Chapter 2, in order to comprehensively understand ERM implementation and practice, the values of managers towards a clearly-defined theoretical ERM domain construct must be measured. Thus, this dissertation aims to contribute to knowledge by empirically developing a valid and reliable ERM values scale and the ensuing ERM values constructs.

Enterprise risk management has been called the new paradigm for risk management (Gordon, Loeb & Tseng, 2009). The first mention of the exact term 'enterprise risk management' (ERM) in an

academic journal was by Dickinson (2001). However, the concept of a portfolio view of risk management and risk mitigation based on empirical calculation of probability has existed in the literature for centuries[4], and the practice of insuring against hazards even dates back millennia (Covello & Mumpower, 1985). So, the call by Bromiley et al. (2015) for ERM to offer a new domain for business and management scholarship highlights a critical business and management sciences issue which has been long overdue.

Similarly to the business and management sciences field of accounting (within which some scholars classify the ERM discipline), risk management has been delayed in achieving an appropriate level of academic interest. The characteristic of ERM as cutting across several well-established business and management sciences disciplines, such as finance, accounting, management, strategy and corporate governance, has contributed significantly to this delay. It is important to note that the different disciplines associated with risk management can interpret risk and risk management very differently. For example, in economics, some authors opine that there is no reward for taking risk (Langlois and Cosgel, 1993), whereby in management strategy, increasing value, for example profits, is a central objective of the organisation and the reward for taking risk (Drucker, 1959). The seminal South African text on risk management (Valsamakis, Vivian and Du Toit, 2010) categorises risk management as falling within the academic field of management. This is the classification that this dissertation endorses, as is outlined in further detail below.

In a way, similar to the discipline of accounting, most of ERM's theoretical development has emanated from the practitioner's perspective – not academia. Significant pressures from the regulatory and consulting domains over the past decade have stimulated an intense interest in ERM by practitioners, leading to the criticism whereby ERM has also previously been described as "the risk management of everything" (Power, 2004). In the past few years, however, ERM has been gaining prominence in top business and management sciences journals. The value of ERM as both an academic research domain in its own right, and further development of ERM as a key focus management practice area, has been recognised and actively expounded.

These efforts have provided confirmation that the presence of ERM, evidenced by secondary data confirming its implementation, enhances the value of firms that implement it. Hoyt and Liebenberg (2011), in a seminal and most-cited ERM article[5], found a positive relationship between firm value and ERM implementation, and concluded, "the ERM premium is statistically and economically significant" (Hoyt & Liebenberg, 2011:816). Building on Hoyt and Liebenberg's (2011) study, Florio and Leoni (2017:1) augmented the findings, and stated that: "firms with advanced levels of ERM

[4] The mathematical theories of probability are linked to the emergence of modern science (Covello & Mumpower, 1985). Often cited references are to Arbuthnot (1692), who first argued that the probabilities of different causes of an event could be calculated.
[5] 385 citations according to Google Scholar on 29 May 2017.

implementation present higher performance, both as financial performance and market evaluation. Additional tests also corroborate the expectation that effective ERM systems lead to higher performance by reducing risk exposure".

Nevertheless, some researchers such as Beasley, Clune and Hermanson (2005) and Power (2009) were not as convinced about ERM's value contribution. The following questions thus arise: If ERM does in fact enhance firm performance, how do scholars and practitioners alike measure the effectiveness of ERM implementation in an organisation? Furthermore, if ERM has a positive effect on the organisation, how can ERM implementation be improved? These questions suggest that continuing to extend the academic body of knowledge on ERM is instrumental to the business and management sciences.

As the academic ERM literature is becoming more mature and nuanced, researchers are calling for a very specific research agenda and development within the risk management domain. In these appeals one key issue continues to crop up – the issue of measurement of ERM. As detailed in Chapter 2 of the dissertation, which comprehensively reviews the academic and practitioner literature of ERM and its measurement, authors such as Kaplan (2011), McShane, Nair and Rustambekov (2011) and Bromiley et al. (2015) all called for ERM measurement to feature prominently on the risk management academic research agenda. Peter Drucker is often credited for saying, "If you can't measure it, you can't manage it," which he regretfully never actually stated in those exact words[6] – but the principle itself is certainly widely accepted in the business and management sciences. Drucker (1959) expounded on uncertainty and management of measurement and risk activities, calling entrepreneurial decisions 'risk-taking decisions', decisions that must be measured. He stated that "to take risk is therefore the essence of economic activity" and furthermore, that "the risks taken must be the '*right risks' "* (Drucker, 1959:240).

> *Any measurement in a business enterprise determines action – both on the part of the measurer and the measured – and thereby directs, limits and causes behaviour and performance of the enterprise. Measurement in the enterprise is always motivation, that is, moral force, as much as it is 'ratio cognoscendi'* (Drucker, 1959:247).

So beyond being the '*ground of knowledge*' within the enterprise, measurement of key phenomena such as risk management reflects on and influences the way the organisation behaves in practice. It is clear that enterprise risk management must be measured empirically to determine its effect on and how it influences the behaviour of the organisation. In order to do that in an appropriately scholarly and rigorous way (one that is consistent with the 'classical' business and management sciences scale and construct development process), (i) the broad ERM domain construct must be clearly and comprehensively defined; and (ii) a valid and reliable, empirically-tested measurement scale must be developed for it.

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[6] The Drucker Institute clarifies this myopia (Zak, 2013).

The literature review of this dissertation presented in Chapter 2 documents that no such ERM scale currently exists in academia. Chapter 2 also discusses the significant gap in the academic literature with regards to the empirical measurement of ERM. Whilst there are examples of qualitative research of risk management practices, and empirical studies determining the value of ERM based on secondary data variables gathered from reports and filings as those outlined above, there are to date only three academic studies identified (Gates, Nicolas & Walker, 2012; Kimbrough & Componation, 2009; McShane et al., 2011), which are based on primary data collected for empirical investigation of ERM practices. The limitations of these studies are discussed in full in Chapter 2. In brief, however, these studies are inadequate in that they were not purposefully designed (i) to define an ERM construct domain and then (ii) to develop the requisite scale and constructs for empirical measurement systematically and with academic rigor i.e. provide full reporting of all results with regard to reliability and validity. In other words, they do not follow the full 'classical' business and management sciences scale and construct development process as presented in the literature. This dissertation aims to clearly abide by the comprehensive scale and construct development processes, as discussed in Chapter 3 detailing the methodology of the study. By doing so, it avoids the criticisms aimed at the studies by Gates et al. (2012), Kimbrough and Componation (2009) and McShane et al. (2011).

However, this exercise is not purely an academic one. More than 50 years after Drucker's (1959) work, Bromiley et al. (2015:273) extended the sophistication of the discourse by observing that:

> *…practitioners need to understand how different individuals and groups within organization define risk, potential biases in risk assessment, and challenges in implementing risk management initiatives. These challenges offer opportunities for firms to look internally at these issues, and collaborate with scholars to produce engaged scholarship.*

Here Bromiley et al. (2015) pointed out that practitioners and academics must collaborate on the development of the ERM body of knowledge, in order to extend the depth and breadth of the theoretical matter, whilst remaining relevant to organisations and their managers. Academics and practitioners acting together will determine and optimise ERM's effectiveness for risk resilience and the benefit and success of organisations (the objective of management) in the global economy.

This dissertation aims to augment the body of knowledge, and the alignment of ERM practice and academic scholarship, by addressing the significant gap that is presented in the literature with regards to the lack of a valid and reliable measurement instrument for ERM values. Collaboration between academic scholarship and ERM practice can be significantly advanced by the development of a measurement instrument of ERM values that is comprehensive, and empirically validated with the appropriate academic rigour. The principal contribution of this dissertation is thus the development of an empirically-tested ERM Values Scale (ERMVS) and the ERM values (ERMVs) constructs comprised thereof.

This contribution is based on the collection of primary data to both create and validate an instrument that can be utilised to measure ERM values by means of a scale of items (manifest variables) that comprises constructs (latent variables). The scale, in turn, will allow for studies based on empirical data to investigate ERM and its effects within the context of the organisation, and thus offer the potential to contribute to the broader objective of management, namely to increase value for the organisation. More specifically, it will allow the empirical testing of the ERM values constructs with other constructs or measures. To illustrate this, one example of cross-validation is also explored in this dissertation, namely, an empirical examination of the relationship between constructs measuring ERM values and national culture values dimensions / constructs such as UAI, in a sample comprised of emerging market risk managers. The importance of risk culture is discussed in depth in Section 2.8, and currently cross-cultural dimensions of ERM have not been investigated in the academic literature, thus adding a further motivation for this study. The national culture (NC) dimensions investigated within the dissertation are constructs with a significant history in the literature as is discussed in Chapter 2. They represent similar constructs to the ERM values constructs, also measuring values of managers, and specific theory-driven hypotheses regarding the relationship between the constructs can be formulated.

1.2 SUMMARY OF RESEARCH PROBLEM

The research problem of this dissertation is clearly centred on the development of an empirical measurement instrument for the ERM domain construct, based on primary data collection. More specifically, the focus of the dissertation is the development of an item-based ERM Values Scale comprised of manifest variables that contribute to a latent variable ERM values construct structure. To be effective, this scale and the resulting constructs should integrate the broad base of ERM academic and practice theory, and be tested with an appropriate level of academic rigour. This instrument must demonstrate both reliability and validity and be utilised to empirically measure the resulting latent ERM construct(s) as well as enable further empirical refinement and cross-validation of the scale and constructs.

A summary of the specific research questions examined in this dissertation include:

- How can a comprehensive theoretical construct domain of ERM values be clearly defined and demarcated?
- What pool of items (manifest variables) can be developed to best reflect (and explain) the ERM values construct domain?
- Do ERM experts confirm the content validity of the item pool, i.e. what is the value of importance they assign to the items, and to what level do they agree on these values?
- Within the specified domain construct, can a scale be developed (ERMVS), based on the item set of manifest variables that empirically measures the ERM values construct domain? Is this ERMVS valid and reliable?

- Does this ERMVS generate constructs (latent variables) that empirically measure ERM values of risk managers?
- Are the national cultural values dimensions (independent variables) derived from the cultural values literature, found to be valid and reliable in the sample selected for this study of emerging market risk managers?
- Do the observed cultural values dimensions, as well as other demographic variables selected for cross-validation purposes, demonstrate a statistically-significant relationship with ERM values constructs in the selected samples of emerging market risk managers?

Chapter 3 is dedicated to providing the full detail of the research methodology followed in this dissertation. The following section of this introduction provides details outlining the scope of the study.

1.3 SCOPE OF THE STUDY

1.3.1 The theoretical ERM domain construct and its measurement

The scope of the study's empirical investigation is defined by the outputs of the literature review in Chapter 2. The literature review acts to specify and demarcate the theoretical boundaries of the overarching ERM values construct. In summary, the broad canon of ERM practitioner, governance and academic literature is reviewed to ensure that all the theoretical contributions related to key ERM success factors are considered in defining the construct domain. Corporate governance mandates such as King (2009), as well as the leading practitioner frameworks, predominantly COSO (2004) and ISO 31000 (2009), are reflected in the review as well as the relevant academic literature.

The methodology of this dissertation with regards to the development of the ERMVS and ERMVs constructs and the empirical testing thereof, is detailed in full in Chapter 3. In summary, the study will follow the 'classical' methodology of scale and construct development from the business and management sciences literature as reviewed in depth by MacKenzie, Podsakoff and Podsakoff (2011). Key aspects of the methodology include:

- Specifying the construct domain;
- Generating the item pool from the literature;
- Testing content validity with experts;
- Assessing validity and reliability of manifest variables;
- Proposing a model and conducting factor analysis of latent variables;
- Cross-validating and reporting on the attributes of the scale; and
- Providing a future research direction for refinement of the scale.

This approach has a strong pedigree, dating back to Churchill (1979), who utilised construct development to create a measure for, and further investigate, customer satisfaction in the marketing domain.

Issues related to both practice and the academic context of ERM are discussed comprehensively in Chapter 2. Beyond theoretical ERM concepts, the actual challenges of the organisation in ERM practice, such as change management and culture (discussed in Section 2.8), including values and behaviours, must be considered in the definition of the broad ERM domain construct to be measured. For this reason, as summarised in Bromiley et al. (2015) above, primary data collection and empirical evaluation thereof, are instrumental to this study

The primary data for this investigation was collected via questionnaire survey instruments incorporating the ERM values item set (scale). After a content validity study comprising a sample of ERM experts, the samples for the study included a group of emerging market risk managers from the telecommunications industry for a pre-study, as well as emerging market risk managers from the Institute of Risk Management of South Africa (IRMSA) for the main study. As is discussed in Chapter 3, utilising subject matter experts for the initial item and domain construct validity testing, as well as the pre-study and main study, provides for successful development of items and scales (MacKenzie et al., 2011).

In addition, demographic information was collected from the respondents, as well as data on their culture values as per the established NC dimensions measures from the literature referred to earlier (Discussed in full in Chapters 2 and 3). The resulting NC dimensions (constructs) were utilised as variables to investigate the effect of culture and for cross-validation of the ERM values constructs.

1.3.2 Contribution of the study

The importance of ERM to the business and management sciences from both practitioner and scholar perspectives was illustrated earlier in the introduction. As outlined above and discussed in detail in Chapter 2, there are currently only three studies investigating empirically-tested measurement instruments for ERM based on primary data collection in the academic literature documented in peer-reviewed journal articles, and these studies suffer from significant limitations which this dissertation's approach was designed to overcome.

The main contributions of this study, which are discussed in detail in Section 5.2, are related to the extension of the ERM body of knowledge in the form of augmenting the empirical measurement of ERM. The key contributions of this dissertation are as follows:

- A comprehensive literature review demarcating the theoretical ERM construct which incorporates the practitioner, governance and scholarly bodies of knowledge;
- A critical analysis of issues in the ERM literature, most specifically the measurement of ERM, and extension of theory around defining and measuring ERM;

- The systematic development of the Enterprise Risk Management Values Scale (ERMVS), a new measure/construct for ERM deeply rooted in theory which has been emprically tested for reliability and validity; and
- The resulting empirical ERM values construct development, validation and reporting thereon.

The study also makes other, more minor contributions around cross-cultural and emerging market perspectives of ERM. The use of the NC dimensions (culture values constructs as independent variables for cross-validation of the ERM constructs) in the Southern African context is novel for this body of knowledge.

The ERMVS represents an original, empirically-tested valid and reliable measurement instrument for ERM constructs. It is comprised of an item pool (manifest variables) which has been distilled from the broad (including practitioner) body of ERM knowledge as presented in Chapter 2. The items were rigorously tested for reliability and validity and were determined to form two constructs (latent variables), namely ‘mechanistic’ and ‘organic’, with significant explanatory power for the theoretical ERM values domain construct. These can be utilised to measure ERM, test, and cross-validate the ERM constructs against other constructs or variables such as NC dimensions. The results of the validity, reliability, factor analysis and cross-validation tests are presented and discussed in Chapter 4.

1.3.3 Limitations of the study

The study has several limitations, the most prominent being that it is primarily an exploratory study to develop and test a new measurement scale and the resultant constructs in a still emerging field of the business and management sciences. The dissertation presents the development of the ERMVS through a methodology where a comprehensive literature review (including practitioner contributions) was followed by implementing the business and management sciences paradigm of scale and construct development. Whilst having a considerable body of knowledge in the academic and practitioner literature spanning decades, ERM is still a relatively new topic. The pool of items considered in the development of the scale and its refinement were rigorously tested through methods such as exploratory factor analysis and confirmatory factor analysis throughout the course of the research, however, their generation required the active judgement of the researcher.

There are many different perspectives on both ERM and the measurement scale and construct development process represented in the literature that needed to be considered by the researcher. These include broad issues such as how best to demarcate the ERM theoretical construct domain and provide expert content validity, to nuances around specific technicalities in the reliability and validity testing. For example, the rotation and loading of factors and interpretation of goodness of fit (GoF) in test procedures such as exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). The two-factor ERMV construct structure ultimately provided a significant degree

of explanatory power for a broad and comprehensive ERM values measure (which in turn demonstrated statistical significance as per the EFA and CFA testing), as well as reliability and validity, however, there is clearly further potential for refinement of the instrument. As another example, additional optimisation of the item pool and factor loading and structure, as well as cross-validation of the scale beyond the culture values dimensions can still take place as is discussed in the future research directions (Section 5.4). The most obvious example is to utilise the ERMVS within a study of a broader management sample across a broader set of organisations – and one that includes management functions of the organisation beyond those typically associated with enterprise risk management.

MacKenzie et al. (2011), in the seminal article on construct measurement and validation procedures, summarised the "life's work" aspect of construct development in the business and management sciences. They pointed towards Nunnally and Bernstein (1994:87-88) who commented that:

> *Each scientist can only perform a relatively small number of major studies in a lifetime, which leaves insufficient time to do all that is required to specify the domain of a construct, develop measures of the construct, and relate these measures to other variables of interest.*

This limitation applies to the work in this dissertation and a number of issues for further development of the ERMVS are clearly outlined for future research directions. Both the limitations of the study and the future research directions are discussed in detail in the concluding chapter of the dissertation (Chapter 5).

1.4 ETHICAL CONSIDERATIONS

This dissertation fulfils the ethical requirements as mandated by the University of Stellenbosch Business School[7]. This study collected primary data on ERM and culture values from respondents – risk managers in emerging markets. Therefore, an informed consent template and explanatory language as laid out by the Stellenbosch University Research Ethics Committee was included in the preamble of the survey questionnaire instruments. As per the Departmental Ethics Screening Committee checklist, the study placed emphasis on consent, indicating that participation is anonymous, of participants' own free will, and that they can at any time discontinue participation in the survey. All three of the survey instruments are presented in their entirety in the appendices: the Expert Group Survey (Appendix C), the Pre-study Survey Questionnaire (Appendix D) and the Main Study Survey Questionnaire (Appendix E).

[7] The ethical requirements are on the University of Stellenbosch (2017) website.

1.5 CHAPTER OUTLINE OF THE DISSERTATION

Following the introduction provided in this chapter, Chapter 2 incorporates the literature review, where the academic and practitioner body of knowledge representing the management sciences, risk, risk management, ERM and culture values domains is presented and reviewed. This provides the theoretical foundation for the definition of the ERM construct domain and its measurement, and introduces NC as a possible variable to cross-validate the ERMVS and ERM construct(s). The initial comprehensive ERM values item set (manifest variables) emanates from the literature surveyed in Chapter 2, and is subjected to empirical testing, the methodology of which is laid out in Chapter 3. As explained above, Chapter 3 follows on from the theoretical demarcation of Chapter 2 to present the full methodological progression of the dissertation. It begins with a statement of the research problem and research questions, and then moves to a discussion of the research philosophy. It then covers the process of building the ERMVS, following the 'classical' scale and construct development methodology as outlined in Section 1.1 above. It concludes by detailing the empirical methods of analysis of the ERMVS and ERM construct(s), including tests for validity and reliability as well as correlations between the variables.

Chapter 4 presents the results of the study and provides a discussion of the findings, focusing on the validation of the ERMVS and ERMVs construct(s) through tests such as EFA and CFA. Chapter 5 concludes the dissertation, clearly stating the contributions of this study based on the detailed report of the findings presented in the previous chapter. It also contains a review of the limitations of the study and recommends possible future research directions.

CHAPTER 2
ENTERPRISE RISK MANAGEMENT (ERM) AND ITS QUANTIFICATION

The revolutionary idea that defines the boundary between modern times and the past is the mastery of risk: the notion that the future is more than a whim of the gods and that men and women are not passive before nature (Bernstein, 1996:1).

2.1 INTRODUCTION

As human beings, we have inherently conducted intuitive risk management from the beginnings of our existence. Kahneman (2011) explained that humans have two systems of thinking – one fast, and one slow. The fast one allows for quick decision-making where we jump to conclusions, ultimately for our survival. Over time this has led us to develop cognitive biases, which can save us from perceived danger, for example, that fire is harmful and fraught with risk. However, once the decision was made that fire would not just be tamed, but "mastered" as stated by Bernstein (1996) in the quote above, so conscious, calculated risk management began. Thinking 'slow', according to Kahneman (2011), allows us to deliberate and apply logic to manage risk and find an upside or advantage in taking opportunities. This is central to the management sciences, particularly from a strategic management perspective, where the goal of the organisation is to maximise value. In terms of risk management in the organisation, there is time to 'think slow" and implement an appropriate ERM framework.

Kahneman, a Nobel Laureate for his work on Prospect Theory with his co-researcher Tversky, and other academics such as Park, Weber, Hsee and Slovic, are some of the main contributors to the field of decision theory. This field is linked to psychology and examines issues around how individuals in an organisation ("agents") make decisions and what factors contribute to these decisions, for example, individuals' propensity to risk-taking. Whilst a detailed review of decision theory is beyond the scope of this dissertation, the topic is touched on throughout the dissertation. Specifically, in section 2.8 to follow, culture as a critical component of ERM practice is discussed, and one of the key success factors for ERM is alignment of the so-called risk culture inside the firm. Individuals comprise the building blocks of an organisation's culture, and thus it is important to understand the values systems of individuals towards ERM practice. There are a number of factors that will influence the organisation's risk culture, starting with the values of each individual, but also linked to the organisation's leadership, rewards systems, processes, overall organisational culture, national culture etc. Using another metaphor, a risk management values system (risk culture) can be viewed as an onion, with different layers moving from the inside (personal sphere) to the outside (groups and formalised processes), influenced by various aspects of culture, such as

organisational and national, within the layers.

The development of formalised risk management in organisations took place parallel to the development of bureaucratic societies; agricultural production is, in effect, risk management for food supplies. The roots of formalised risk management were formed and financial risk management was documented in the developing world of global commerce within the insurance industry, when a market for marine insurance was founded by Edward Lloyd at his coffee house on Tower Street in London in 1688[8]. Lloyd's motto is *Fidentia*, Latin for 'confidence', which very much speaks to Bernstein's view of not being passive before nature, as the early seafarers certainly were not passive as they confidently set out to master the risks of the sea.

Concerning risk in the business and management sciences, the objective of an organisation is to create value, and risk certainly affects this objective. Elaborating on a point made in the introduction chapter, Drucker, who is considered to represent the strategic management discipline, (1959:240) stressed the importance of risk and risk management to an organisation stating that "the central fact about economic activity is that, by definition, it commits present resources to future and therefore highly uncertain expectations. To take risk is therefore the essence of economic activity" and furthermore, that "the risks taken must be the right risks". From the insurance market to the stock market, risk management formally developed further in sophistication, most obviously in the fields of finance and economics. Risk management is now firmly established as its own discipline in the academic management sciences. Chapter 1 of this dissertation highlighted that the risk landscape of business management is becoming ever more Volatile, Uncertain, Complex and Ambiguous (VUCA), and established the criticality of ERM from a practitioner's perspective, as evidenced by the global mandates around its implementation and corporate governance reporting requirements. As will be discussed further in this chapter, the importance of ERM to the resilience and performance of organisations, and the role that practitioners and academics must play in its continued development are clearly documented in the literature.

Kaplan (2011:373) posed the following question: "Will a single risk management system work for all types of risks, or do different types of risks require different types of risk management systems?" This comment highlights the need for a discussion of the history, development and measurement of risk management, leading to enterprise risk management, which is the basis of this chapter.

Kaplan (2011) also linked the topic of risk management to the three most important subject areas in accounting research, namely financial reporting, management control, and auditing. He identified future focus areas of research that build on the accounting discipline's competitive advantage of expertise in domains such as measurement, valuation and reporting. Of these, the discussion in this chapter of the dissertation homes in on questions of the valuation, measurement and

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[8] Pelzer and Pelzer (1982) give a good account of the coffee house scene in Augustan London in the 17th century.

quantification of risk management, and builds the theoretical foundation of an enterprise risk management values measurement instrument (or scale) – the ERMVS – a key contribution of this dissertation.

2.2 THE HISTORY OF RISK AND RISK MANAGEMENT IN THE LITERATURE

Risk has many different definitions, depending on the context. As indicated there are layers of risk and risk management in individuals (values, attitudes, behaviours), organisations, society and the business and management sciences. Merriam-Webster (2004) defined 'risk' as "possibility of loss or injury". For the general populace, the word 'risk' thus has a negative connotation associated with it, and most laypersons equate risk with an anticipated downside. However, there is also an upside usually associated with risk, and hence the business management expressions "No risk, no reward" and "High risk should equal high reward".

The modern history of the academic literature surrounding risk management begins as far back as the era of economist, Frank Knight, who in 1921 published the seminal work *Risk, Uncertainty and Profit*[9]. In terms of assessing risk, Knight (1921) argued that it is not appropriate to simply extrapolate the future from past events. This is a point that Bernstein (1996) elaborated on when he stated that we cannot rely completely on empirical evaluation of the past for an assessment of current risks. Bernstein (1996) also pointed out that *a priori* reasoning on its own does not eliminate indeterminateness from the future. Knight (1921) made the crucial point that uncertainty is a critical component of risk, as for him, uncertainty is made up of both ambiguity and variability. A more appropriate definition of risk than that of Merriam-Webster (2004), certainly in a business risk management context, was proposed by Hillson and Murray-Webster (2007:6) as uncertainty combined with consequences, or more specifically, "uncertainty that matters". This is the definition of risk, based on the principle of the effect of uncertainty on objectives of the organisations and also referred to by the standards such as ISO (2009) and COSO (2004), proposed in the context of business risk management within this dissertation. Risk management in practice, and risk management in academia are elaborated on in further detail in the following sections.

Langlois and Cosgel (1993) indicated that one of the main themes surrounding Knight's formative text is the debate in economics between behavioural and rational economics. In this debate, it was argued whether Knight (1921) meant to distinguish whether risk or uncertainty refers to measurable or immeasurable outcomes, whether these are objective or subjective, and finally, at a most practical level, whether they are insurable or uninsurable (insurance being the root of formalised risk management as referred to Lloyd's above). Following this line of reasoning, a multitude of scholars, as referenced by Langlois and Cosgel (1993), interpreted Knight as defining risk as situations where one could define a full range of outcomes and assign probabilities to them

[9] Cited more than 16 000 times in the literature, according to Google Scholar on 29 May 2017.

(i.e. roulette), and uncertainty as to where one could not. According to these definitions, risk is insurable, and uncertainty is not. Following these early interpretations of Knight, this discourse fed into one of the more significant 'classical' economic sciences rhetorical debates around objective probability on the one hand, and subjective probability on the other.

The subjective probability school "effectively routed the former", according to Langlois and Cosgel (1993:457). The influence of the subjective perspective on risk management, and more specifically Enterprise Risk Management and its associated values, is discussed in further detail in this dissertation. However, it is important in a broad literature review, to summarise here, that the subjective probability theory can be characterised by the recognition that objective, probabilistic aspects of economics, such as the stock market, are influenced by subjective assessments of risk. Examples of subjective assessment of risk within finance theory are those investors taking into account moral hazard[10] and adverse selection by agents promulgated by subjective decision-making based on information asymmetry[11]. Such examples of the subjective influence within finance theory, also relate specifically to behaviour and values around ERM, which too, is affected by issues such as moral hazard and information asymmetry (Power, 2009).

To develop this point further, one needs to consider Knight's distinction between the mechanical and organic (biological) frameworks. According to Langlois and Cosgel (1993), Knight (1921) contrasted perfect knowledge in the mechanistic domain with its imperfection in organic life, bringing out the importance of consciousness in the deciding and controlling processes.

It is worth a brief digression to discuss the seminal work of Burns and Stalker (1961)[12] which has influenced over half a century of business and management sciences literature, in particular around the structure of organisations. In summary, Burns and Stalker (1961) determined a classification system for organisations based on mechanistic and organic elements. The key factors for each classification are exhibited in Table 2.1 below.

According to Burns and Stalker (1961:104):

> *We are now at the point at which we may set down the outline of the two management systems which represent for us the two polar extremities of the forms which such systems can take when they are adapted to a specific rate of technical and commercial change. The case we have tried to establish from the literature, as from our research experience is that the different forms assumed by a working organization do exist objectively and are not merely interpretations offered by observers of different schools.*

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[10] Moral Hazard is defined as "the likelihood of investors to take greater risks because of the knowledge that losses incurred as a result of those risks will be covered by another" (Merriam-Webster, 2004).
[11] Information asymmetry is a more recently discussed phenomenon in the literature foreshadowed by Knight (Langlois & Cosgel, 1993).
[12] Burns and Stalker's (1961) *The management of innovation* has been cited over 16 000 times according to Google Scholar when accessed on 28 August 2017.

The adaptability of organic structures is theorised to hold them in good stead in terms of innovation and adapting business models. As alluded to by Knight (1921), mechanistic and organic structures influence the management of risk, risk management structures and decision-making. These considerations are certainly included in the broader ERM framework, as is discussed throughout this dissertation, in particular in Section 2.8 on risk management culture.

In his view of the firm (or organisation in the context of recent, modern risk management literature), Knight (1921) furthermore took into account the potential differential in risk aversion (as practically acted out) between the entrepreneur (principal), and workers (agents) of the firm[13].

Knight (1921) also pointed out, that risk is an economic concept at work in business decisions, owing to the inherent existence of known and unknown sources of variability of outcomes (uncertainty). Operationally, in the business context, risk thus often involves a great deal of uncertainty. Knight's work is all the more appropriate because he highlighted that immeasurable uncertainty is potentially the most dangerous, and this type of scenario as described by Knight (1921) could be considered a predecessor to a "Black Swan[14]" as popularised by Taleb (2007).

[13] Agency Theory being one example.
[14] A "Black Swan" is an "unknown, unknown" as described by Taleb (2007). It is an example of the problem of induction: Europeans thought all swans were white and had an expression "White as a swan", then the unimaginable happened and in Australia swans were black.

Table 2.1: The mechanistic / organic classification matrix

Mechanistic	Organic
1. The specialised differentiation of functional tasks into which the problems and tasks facing the concern as a whole are broken down.	1. The contributive nature of special knowledge and experience to the common task of the concern.
2. The abstract nature of each individual task, which is pursued with techniques whole (i.e., the functionaries tend to pursue the technical improvement of means, rather than the accomplishment of the ends of the concern).	2. The 'realistic' nature of the individual task, which is seen as set by the total situation of the concern.
3. The reconciliation, for each level in the hierarchy, of these distinct performances by the immediate superiors, who are also, in turn, responsible for seeing that each is relevant in his own special part of the task.	3. The adjustment and continual re-definition of individual tasks through interaction with others.
4. The precise definition of rights and obligations and technical methods attached to each functional role.	4. The shedding of 'responsibility' as a limited field of rights, obligations, and methods. (Problems may not be posted upwards, downwards, or sideways as being someone else's responsibility.)
5. The translation of rights and obligations and methods into the responsibilities of a functional position.	5. The spread of commitment to concern beyond any technical definition.
6. Hierarchic structure of control, authority, and communication.	6. A network structure of control, authority, and communication. The sanctions which apply to the individual's conduct in his working role derive more from presumed community of interest with the rest of the working organisation in the survival and growth of the firm, and less from a contractual relationship between himself and a non-personal corporation, represented for him by an immediate superior.
7. A reinforcement of the hierarchic structure by the location of knowledge of actualities exclusively at the top of the hierarchy, where the final reconciliation of distinct tasks and assessment of relevance is made.	7. Omniscience no longer imputed to the head of the concern; knowledge about the technical or commercial nature of the here and now task may be located anywhere in the network; this location becoming the *ad hoc* centre of control authority and communication.
8. A tendency for interaction between members of the concern to be vertical (i.e., between superior and subordinate).	8. A lateral rather than a vertical direction of communication through the organisation, communication between people of different rank, also, resembling consultation rather than command.
9. A tendency for operations and working behaviour to be governed by the instructions and decisions issued by superiors.	9. A content of communication which consists of information and advice rather than instructions and decisions.
10. Insistence on loyalty to the concern and obedience to superiors as a condition of membership.	10. Commitment to the concern's tasks and to the 'technological ethos' of material progress and expansion is more highly valued than loyalty and obedience.
11. A greater importance and prestige attaching to internal (local) than to general (cosmopolitan) knowledge, experience, and skill.	11. Importance and prestige attach to affiliations and expertise valid in the industrial and technical and commercial milieux external to the firm.

Source: Burns and Stalker, 1961.

The relevance of this historical body of literature to the dissertation is how closely it ties in with the most recent risk management literature and publications. For example, the International Standards Organisation (ISO), which is discussed in detail in Section 2.5 below, defined risk in the context of enterprise risk management in only six words, very simply as "the effect of uncertainty on objectives" (ISO 31000, 2009:1). As outlined in Section 2.5, while brief, this regulatory / risk management practitioner's definition takes into consideration the whole canon of academic literature preceding it, encompassing the theoretical debates and rhetoric around the objective and subjective, the measurable and immeasurable. ERM is thus at the crossroads of both objective, probabilistic outcomes – as referred to in operational risk mitigation, for example, by insurance and actuarial premiums – and subjective behaviour – for example, so-called 'risk culture'. ERM recognises the effects of the internal and external context of the organisation and its stakeholders as the organisation attempts to achieve its objectives by minimising information asymmetry through a systematic framework of managing risk holistically.

As illustrated in Figure 2.1 below, through its history, risk management has moved from the most operational and quantifiable – actuarial insurance – to the most qualitative and immeasurable – strategy and issues such as brand risk, in both practice and the academic literature.

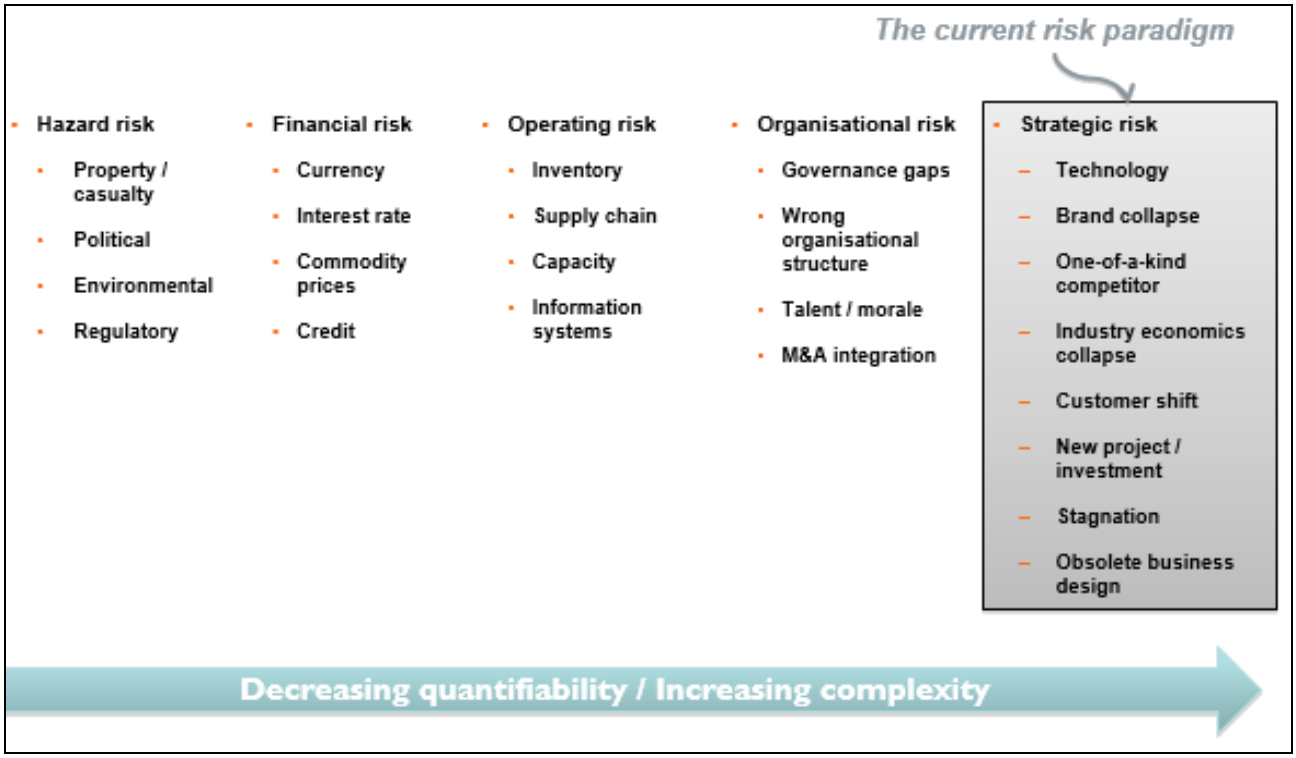

Figure 2.1: The risk frontier

Source: Adapted from Nocco and Stulz, 2006.

Dickinson (2001) made the first 'formal' mention of the specific terminology of enterprise risk management in a peer-reviewed academic journal. The article traced the presence of risk management as an integral part of the decision-making process of companies to the late 1940s

and early 1950s. Two strands of risk management from the literature have over the past couple of decades been brought together towards ERM, which presents a holistic view of risk management. The strand first is management of insurance and financial risks. These, from a practitioner's perspective, link back centuries to institutions such as the previously-mentioned Lloyd's of London and the early stock exchanges. The second strand stems from more general management-type thinking incorporating contingency planning (Dickinson, 2001). The association of risk management and contingency theory is discussed in greater detail in the following section, where the definition of ERM, the new risk paradigm, is provided.

2.3 ENTERPRISE RISK MANAGEMENT: THE NEW RISK PARADIGM

2.3.1 The emergence of ERM

According to Dickinson (2001), since the mid-1990s, ERM has emerged as a concept and a management function within corporations. This is due mainly to two factors: (i) high profile company failures featuring huge losses which can be argued to continue presently (despite formalised ERM); and (ii) the fact that shareholder models are playing a greater role in strategic planning. Modern strategic planning models are generally based on shareholder value concepts which in turn are influenced by finance theory where risk has always played a prominent role (Dickinson, 2001). His view on the organisational setting of ERM is outlined in Figure 2.2 below.

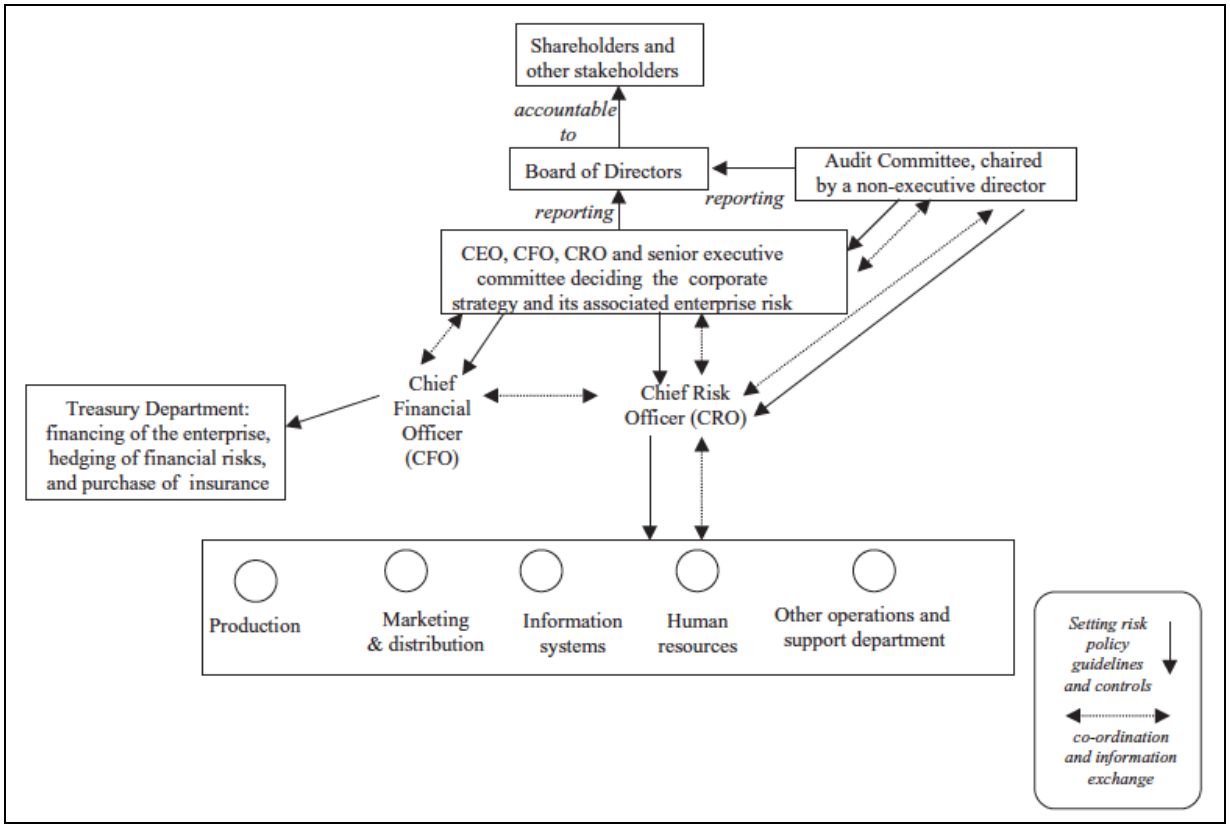

Figure 2.2: ERM and its organisational setting

Source: Dickinson, 2001.

Some key takeaways from Dickinson (2001) as outlined in Figure 2.2 are that all aspects of the enterprise (including technical, human resources and information systems) are included in the holistic ERM view, thus truly making it "enterprise-wide". Also, important to note is the positioning of a Chief Risk Officer (CRO), a relatively new executive function in the organisation. In the literature, some studies used the presence of this role as a variable for empirical testing to determine the presence of ERM in the enterprise (e.g. Hoyt & Liebenberg, 2011 and Florio & Leoni, 2017). The interplay between the executive functions and the Board hints at some of the organic or subjective issues that may arise in terms of the organisation's culture and decision-making around risk.

Altuntas, Berry-Stölzle and Hoyt (2011) provided a further strong theoretical contribution by introducing the concept of layering the strategic and operational components of ERM models. A high-level version of the ERM model, which could be considered a conceptual framework of ERM, is exhibited in Figure 2.3 below.

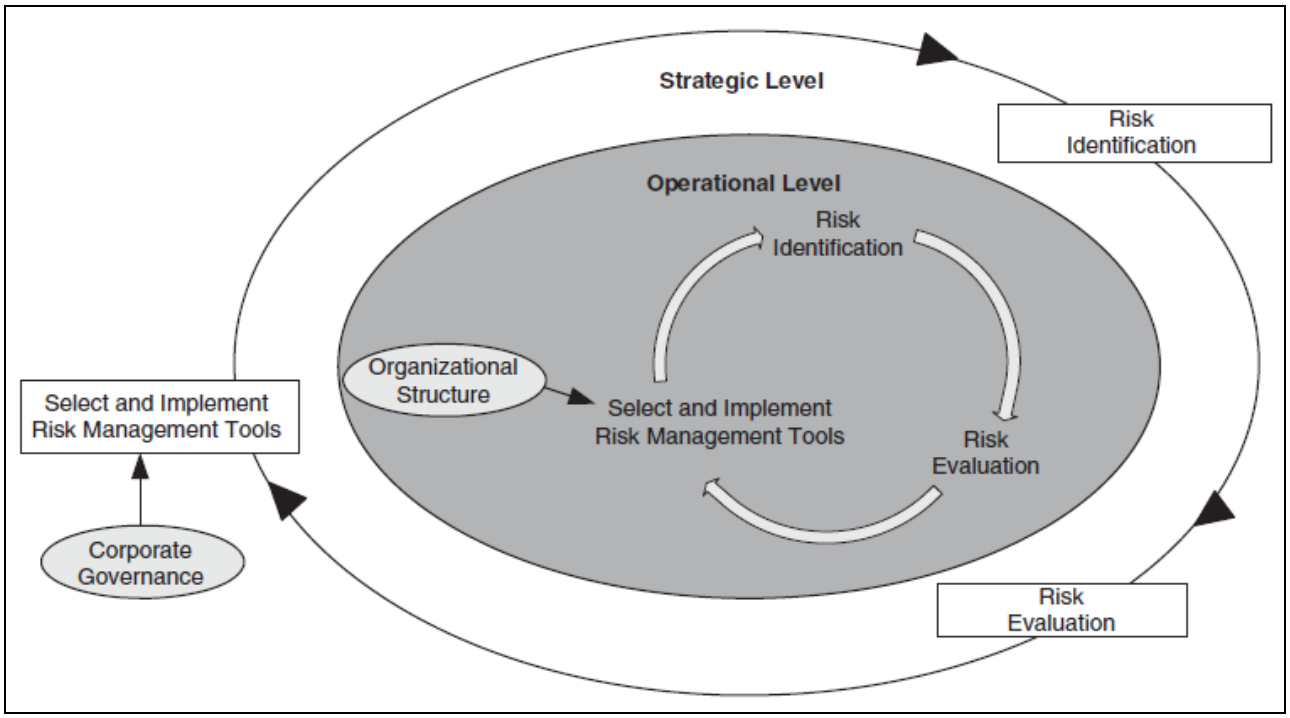

Figure 2.3: Conceptual framework of the ERM model

Source: Altuntas et al., 2011.

This model is very helpful to directly understand the relationship of the ERM focal points, in terms of the ERM processes and levels, within the industry ERM standards COSO (2004) and ISO (2009), which are elaborated on below.

2.3.2 Development of ERM in the academic literature

A comprehensive review of the ERM literature was presented by Gordon et al. (2009:302):

> *An increasing number of scholars view ERM as the fundamental paradigm for managing the portfolio of risks confronting organizations. By adopting a systematic and consistent approach (or process) to managing all of the risks confronting an organization, ERM is presumed to lower a firm's over-all risk of failure and thus increase the performance, and in turn, the value of the organization.*

Developing the academic perspectives in his argument, Gordon et al. (2011:302) furthermore stated: "A general argument gaining momentum in the literature is that the implementation of an ERM system will improve firm performance."

From an academic research standpoint, the topic of risk management in general, and more specifically ERM, is multi-disciplinary and is only represented by a couple of decades of literature development. Beyond Gordon et al. (2009) cited above, several key articles have been published recently in various management science disciplines such as accounting and strategy, whereby authors such as McShane et al. (2011), Paape and Speklé (2012) and Bromiley et al. (2015) provided further comprehensive examples of detailed review of the risk management literature. In the past decade, articles critical of ERM have also been published on the topic in leading management science journals with evocative titles such as *The risk management of nothing* (Power, 2009) and *Is enterprise risk management real?* (Arena, Arnaboldi & Azzone, 2011).

2.3.3 ERM implementation

Given its nature as an umbrella concept for a broad multi-pillared process that should be adaptable enough to suit any organisation in any industry, ERM sets itself up for potential conflict and inconsistencies. ERM is fundamentally a practice, which must be executed by an organisation and as such "One size doesn't fit all" according to Mikes and Kaplan (2015). At a minimum, ERM thus incorporates a variety of implementation variables (Woods, 2009[15]), dynamics (Arena et al., 2010), and systematic variances and cultures (Mikes, 2009).

These scholars and the others encompassed in the literature review have provided insights into the broad range of '*success factors*' or '*critical aspects*' of ERM. An example which captured categories at a high level was provided by Gordon et al. (2009), who clearly indicated four domains of ERM implementation namely: Strategy, Operation, Reporting and Compliance. Other authors encompassed in this literature review elaborated specifically on a variety of ERM success factors. This dissertation seeks to distil these success factors or critical aspects, into the most concise relevant items (manifest variables) for ERM measurement (within an item pool) as discussed later in this chapter. These specific success factors may practically differ from organisation to

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[15] Woods (2009) referred to Contingency Theory, which has been applied to accounting scholarship in the sense that there is no 'best' way to implement a management practice in an organisation, instead, it is *contingent* on variables unique to each organisation. Contingency Theory is linked to the mechanistic-organic debate in that organic organisations are believed to be more adaptable to applying contingency planning.

organisation in their execution, but clearly show patterns or themes, which taken in combination with the practitioner standards, get to the heart of what really matters in the implementation of ERM by an organisation. The 'pillars' of ERM discussed below provide further details of categories encompassing ERM success factors within the overall theoretical domain construct.

The stances of the various authors demonstrate many conflicting views on the science of risk management. Several found empirical evidence of a positive relationship between firm value and the use of ERM (see for example Hoyt & Liebenberg, 2011), and other detractors expressed that risk management can be merely a compliance exercise, comprised of bureaucratic documentation of risks, and at worst is deemed as "illusory" and does more harm than good (Power, 2009).

Arena et al. (2010:659) described ERM implementation at its most basic level stating "the ERM approach seeks to link risk management with business strategy and objective-setting, entering the domains of control, accountability and decision-making". Arena et al. (2010:659) further commented that:

> *Despite the rational approach proposed, the transition of risk management from a narrow technical focus to the strategic sphere has turned ERM into a fluid and poorly defined instrument. ERM can be different things in different organizations, or even within the same organization at different times.*

Therefore, Arena et al. (2010:659) believed that ERM is characterised by a broad spectrum of components, which would need to be empirically captured in order to measure its implementation. "Recent years have seen an explosion of interest in risk management" according to Arena et al. (2010: 660), who also provided a detailed summary of ERM's development.

Hoyt and Liebenberg (2011:795) summarised the comprehensive nature of ERM succinctly, stating:

> *Unlike traditional risk management where individual risk categories are separately managed in risk 'silos,' ERM enables firms to manage a wide array of risks in an integrated, enterprise-wide fashion. More broadly, ERM is said to promote increased risk awareness that facilitates better operational and strategic decision-making.*

According to Hoyt and Liebenberg (2011:795) the earliest evidence of formalised ERM activity is 1998, according to the methodology of scouring databases and media activity. There is a large increase in ERM activity accelerating through the mid-2000s and into the following decade. As did other authors such as Kaplan (2011) previously discussed, Hoyt and Liebenberg (2011) clearly raised their concerns about both the value and measurability of ERM. They highlighted the future research direction, stating: "The absence of clear empirical evidence on the value of ERM programs continues to limit the growth of these programs" (Hoyt & Liebenberg, 2011:796). This is one of several clear calls to conceptualising a broad frame for a clearly-defined theoretical ERM construct and measurement thereof through a values lens. Further breadth is provided to the ERM literature landscape by McShane et al. (2011:644) who stated:

> *[Unlike traditional risk management's] silo-based risk management, the purpose of ERM is to gain a systematic understanding of the interdependencies and correlations among risks. A fundamental concept of ERM is the aggregating of risks into portfolios, then hedging the residual risk, which is more efficient and value maximising than dealing with each risk independently.*

Emphasising the upside of risk as highlighted in the introduction of this chapter, McShane et al. (2011: 645) stated:

> *A basic concept of ERM is that a firm should reduce exposure to risk in areas where it has no comparative information advantage[16] and exploit risks in areas where it has an advantage, meaning that total risk can possibly increase under ERM risk allocation.*

Of course, with an increase in risk, comes the corresponding increase in potential for upside and return. One example of an organisation implementing this theory in practice was evidenced in the case study of Mobile Telephony Networks (MTN) Group (Baron, 2008), whereby MTN Group in its internationalisation strategy exploited its strength in information regarding technical expertise and political savvy. MTN turned potential risks of its African expansion strategy into an advantage that led to the phenomenal growth that the company was able to provide to its shareholders over more than a decade (although a recent example of a possible low-tail outcome specific to MTN Nigeria is referred to below).

Altuntas et al. (2011), whose ERM model was presented earlier, provided an additional perspective on a direction towards capturing aspects of ERM in so-called dimensions or constructs, which impact on ERM implementation i.e. an organisational culture of 'Risk Awareness'. According to Altuntas et al. (2011:417), ERM consists of the following five dimensions critical to implementation from a conceptual perspective:

i) Processes to identify all relevant risk categories and exposures;
ii) Quantitative models to measure and evaluate these risks;
iii) Tools, like risk limits, to manage them efficiently;
iv) An organisational culture of risk awareness; and
v) A management approach that integrates ERM and all its components into operational and strategic decision-making.

Altuntas et al. (2011:419) also explored the concept of linking within ERM implementation a strong element of culture and company success, whereby national culture, risk culture, corporate culture, organisational culture etc. all play a role in determining an organisation's culture. As is discussed in the risk culture section (Section 2.8) below, culture is comprised of the values of the directors, managers and employees of an organisation. In the Altuntas et al. (2011) study, 44 percent of firms said they had a strategy to address a risk management culture in the organisation. It is critical to

note, that Altuntas et al. (2011:433) actually proposed a construct for risk management culture with six manifest variables exploring issues such as employee training and consideration of risk management in decision-making. Being one of only three empirical studies published in academic journals utilising primary data on risk measures / constructs / dimensions, and the only one to incorporate items specific to risk culture, the work by Altuntas et al. (2011) is a critical focal point of the literature review. Details of how the Altuntas et al. (2011) study collected primary data for empirical investigation of these dimensions is provided below in Section 2.7 on measurement of ERM.

Finally, Altuntas et al. (2011) brought a rigorous discussion surrounding the possibility that an industry survey on risk management implementation can be incorporated into an academic study. The survey approach adopted is similar to that of the renowned Tillinghast industry risk survey, which was first implemented in 2002 and conducted regularly thereafter. Concluding that the industry survey can be usefully applied in an academic context, and should even be improved on, Altuntas et al. (2011:417) pointed out that their "comprehensive survey considers a broader scope of ERM components than those considered in the Tillinghast study". This comment validated the practical contributions in a sense, and paved the way to apply a variety of other industry instruments in academic studies such as Standard & Poor's (S&P) ERM Index (Standard & Poor's, 2007) and Aon's Risk Maturity Index (Aon, 2015)[17]. These practitioner surveys, and their contribution to the development of this study's ERMVS, are explored in further detail below.

As discussed in detail in the methodology section in Chapter 3, this dissertation is very focused on developing a scale for the measurement of ERM values items and constructs, and several of the Altuntas et al. (2011) items are ultimately transcribed to the ERM item pool in the development of the ERM values measurement instrument stemming from this dissertation.

2.3.4 ERM in practice and in academia

This convergence between practice and theory is at the crux of the research problem of this dissertation: How do practitioners value and ultimately implement the ERM domain construct? Therefore, in this study, a scale is proposed incorporating primary data on ERM values gathered from practitioners. In their study, Altuntas et al. (2011) presented strong arguments for the theory behind some of the ERM constructs like risk assessment, and why certain manifest variables were selected. One important limitation of the approach adopted by Altuntas et al. (2011) is that neither the academic literature, nor the body of ERM theory, was formally and comprehensively surveyed

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[16] Refer earlier Information Asymmetry comments.

[17] The industry award-winning Aon Risk Maturity Index tool was developed by Aon in partnership with the Wharton School of the University of Pennsylvania. The index measures 40 components of 'risk maturity' that are grouped into 10 overarching characteristics/statements of best practices. The Index is a confidential, web-based survey containing approximately 125 multiple-choice questions focused on observable practices and structures related to corporate governance, management decision-making and risk management. (AON, 2015)

in developing the constructs and items utilised in the surveys. Their approach was thus derived from an incomplete base (of items). Consequently, this shortcoming is directly addressed in this dissertation and discussed further in Section 2.7 on measurement of ERM.

Altuntas et al. (2011) concluded with the observation that companies and industries most facing "costly low-tail outcomes", i.e. the possibility of extremely unlikely but calamitous events, showed enhanced benefit from ERM. This could, for example, be applied towards sectors such as telecoms in Africa, MTN specifically, as per the internationalisation case study referred to above. This MTN Nigeria example demonstrated that, even if a risk like the fine for regulatory non-compliance is present in the risk register and being monitored, the enormity of the fine (at one stage proposed to be more than US$10 billion) can be a low-tail outcome (unlikely but calamitous) that could cripple an enterprise with a single risk event. The telecommunications industry in emerging markets certainly has the potential for numerous low-tail outcomes – highly unlikely outcomes – such as political risk in the countries of dramatically changing laws and ownership structures.

An article featuring a qualitative methodology and introducing the study of practice to examine ERM implementation was put forward by Arena et al. (2011:792). The concept of maturity levels of ERM was presented – being labelled as "responsive, discursive and prospective". The article by Arena et al. (2011) also provided a strong link towards this specific research exercise where the authors referred to the downside or limitations of a case study research methodology to study the phenomenon of ERM, and noted that in future, surveys and industry-specific in-depth studies would be useful around ERM implementation.

Paape and Speklé (2012:535) also provided a comprehensive survey of the literature and made a critical point regarding the implementation of frameworks (like COSO, 2004 for example) being dubbed 'Best Practice' without any theoretical or empirical evidence of that status. This criticism of COSO (2004) is explored further in the next section on industry ERM frameworks This challenge again stresses the importance of having access to a rigorous, empirical measure of 'ERM effectiveness' across a broad conceptual spectrum, incorporating industry and practice, but developed with academic rigour.

2.4 INDUSTRY ERM FRAMEWORKS

2.4.1 Overview

From the practitioner's perspective, ERM has been firmly entrenched in the boardroom agenda. According to Fraser and Simkins (2010), this is due both to an increase in corporate governance initiatives worldwide, as well as the gathering global acceptance in terms of the strategic and competitive value that ERM provides. The major consultancies, such as Deloitte and KPMG, and ratings agencies, such as S&P's, have large resource functions focusing on Governance Risk and Compliance (GRC). There is a multitude of practitioner documentation and literature in the public

domain around ERM, risk maturity, risk appetite and other related topics produced by these firms. Professional risk associations such as the UK's Institute for Risk Management (IRM) and South Africa's parallel organisation, the Institute of Risk Management of South Africa (IRMSA), certify professional risk managers and also play a significant role in this regard. As demonstrated by the fact that virtually all the Fortune 500 companies report that they field an ERM function, implementing a successful ERM framework is clearly necessary to the long-term governance and sustainability of a company (Fraser & Simkins, 2010).

There are two predominant regulatory frameworks that organisations have utilised to implement ERM. These are also the two main practitioner "best practice standards" applied globally for ERM, namely COSO (2004) and ISO 31000 (2009). Both standards are currently being updated with input from all stakeholders and updated versions were anticipated to be released in 2017. The two frameworks show many similarities, but also some significant differences. As a result, both practitioners and scholars have rigorously debated them. COSO (2004) has been more prominent in the academic literature (Paape & Speklé, 2012) – perhaps, in part, because it is older. This dissertation does not intend to explore these two standards in minute detail and attempt to make a contribution towards the debate about which is more appropriate or 'better'. Both standards were utilised in the methodology applied to address the research questions, namely the transposition of ERM statements for the initial pool of ERM measurement items. These standards are referenced in the majority of the academic ERM literature and thus form the basis of the pillars demarcating the ERM theoretical conceptualisation or landscape for this dissertation. Fraser and Simkins (2010) concluded that COSO and ISO[18] are quite simply the two most widely-applied constructs for best practice practical management applications of ERM.

Subsequently, much of the theoretical underpinning for the methodology is drawn from this practitioner's body of literature i.e. the industry frameworks. For example, the ERM values items (manifest variables) discussed in detail in Chapter 4 are derived in part from both these standards. These culminate in the final empirical ERM values measurement item pool, which in turn leads to the development of the ERM Values Scale and ultimately the model comprised of the ERM values constructs (latent variables). The two industry frameworks are discussed in more detail in the following sections.

2.4.2 COSO

According to Arena et al. (2010), the emergent, all-encompassing risk approach that stemmed from the increase in corporate governance due to the series of business scandals and financial

[18] The Committee of Sponsoring Organizations of the Treadway Commission (COSO) is a committee of executives working in conjunction with PricewaterhouseCoopers to design frameworks in use by thousands of enterprises to help them control activities and establish and achieve objectives (COSO, 2004). COSO is one of the leading setters of global corporate governance standards. The International Standard Organisation's (ISO) risk management framework ISO 31000 International Risk Management Standard – Principles and guidelines (ISO, 2009) is considered a leading ERM framework for practitioners.

disasters from the 1980s through 2000 to 2008, was formalised in 2004 by the Committee of Sponsoring Organisations of the Treadway Commission (COSO). This provided the definitive guide for building effective enterprise risk management, namely COSO (2004). The standard is summarised by the COSO 'Cube' illustrated in Figure 2.4 below which embodies a three-dimensional matrix of eight elements deemed essential for achieving strategic, operational, reporting and compliance goals for ERM.

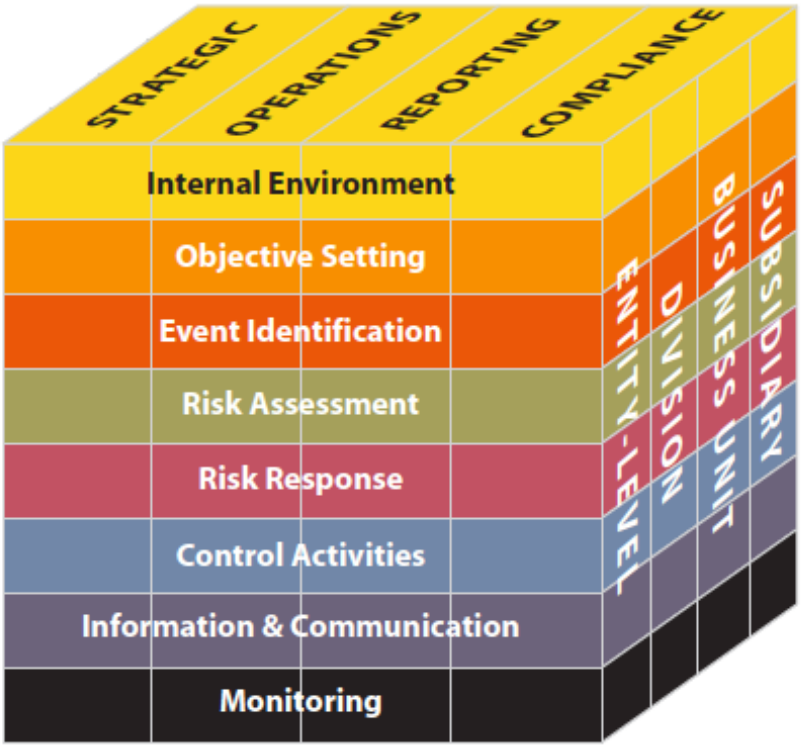

Figure 2.4: The COSO Cube

Source: Coso, 2004.

COSO's (2004) 8-part 'Cube' was utilised by Gates et al. (2012) in terms of setting the pillars (internal environment, objective setting, event identification, risk assessment, risk response, control activities, information and communication, and monitoring) that formed the framework for the risk items comprising the variables in his study. The Gates et al. (2012) study is discussed in further detail below as it is integral to the development of the methodology and item pool for this dissertation.

2.4.3 ISO 31000

ISO 31000 (2009) was developed in a consensus-driven process over four years, through seven drafts and involving hundreds of risk management professionals. Purdy (2010) believed it to be a new, simple way of thinking about risk and risk management. It was intended to begin the process of resolving the many inconsistencies and ambiguities that have existed between many different approaches and definitions within the realms of ERM practice and academic publication. The main tenets of ISO 31000 (2009) are outlined below in Figure 2.5.

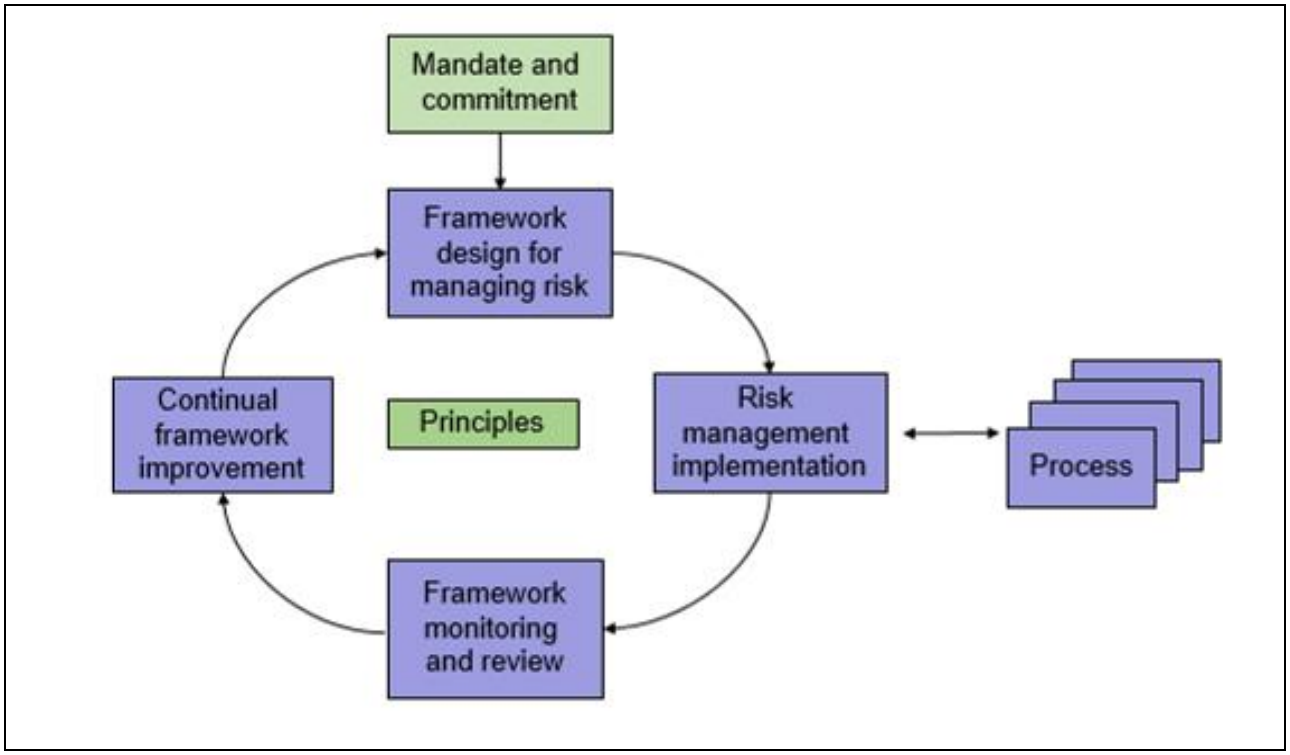

Figure 2.5: Overview of the ISO 31000 process

Source: ISO 31000, 2009.

ISO 31000 (2009) was the standard eventually selected to create the broader frame of the ERM values item pool for this study as discussed in Chapter 3 on methodology. Purdy (2010:886) stated that its publication represented "a very significant milestone in mankind's journey to understand and harness uncertainty". Within this study, ISO 31000 (2009) was preferred over the COSO (2004) approach because it is the broadest and most comprehensive framework for ERM available today and allows for the integration of additional "organic" measures such as "Continual Improvement". Such focus on continual improvement is generally a component of the catalogue of ISO standards of management and calls for a "Plan, Do, Review" methodology for revisiting processes and determining if they are being implemented optimally.

With reference to the earlier debate between organic and mechanistic perspectives on risk introduced in Table 2.1, it is useful to apply this debate to the industry ERM framework constructs. Whilst both ISO 31000 (2009) and COSO (2004) have mechanistic foundations anchored in business practices such as insurance and audit, ISO 31000 could be considered the more organic framework for implementing ERM, with a stronger emphasis on culture and continual improvement. For reasons explained in more detail below, it was determined that ISO 31000 (2009) offered a more appropriate structure for framing the item pool for the purposes of this research, and thus, on conclusion of the literature review, formed the basis of a starting point to categorise the items and to ensure that the full breadth of potential ERM items was examined.

ISO 31000 (2009) overlays to a large degree the components comprising COSO's (2004) 8-part 'Cube'. Nevertheless, it is important to note that, while the ISO 31000 provided more guidance as the basis for the broader framework, both standards were examined in great detail and ERM values items for the empirical research were derived from them. As outlined in Section 2.1, it is not the purpose of this dissertation to debate the respective advantages and disadvantages of the ISO 31000 (2009) and COSO (2004) frameworks, as both were instrumental in developing the literature review and leading to the methodology to select items representing potential measures of ERM.

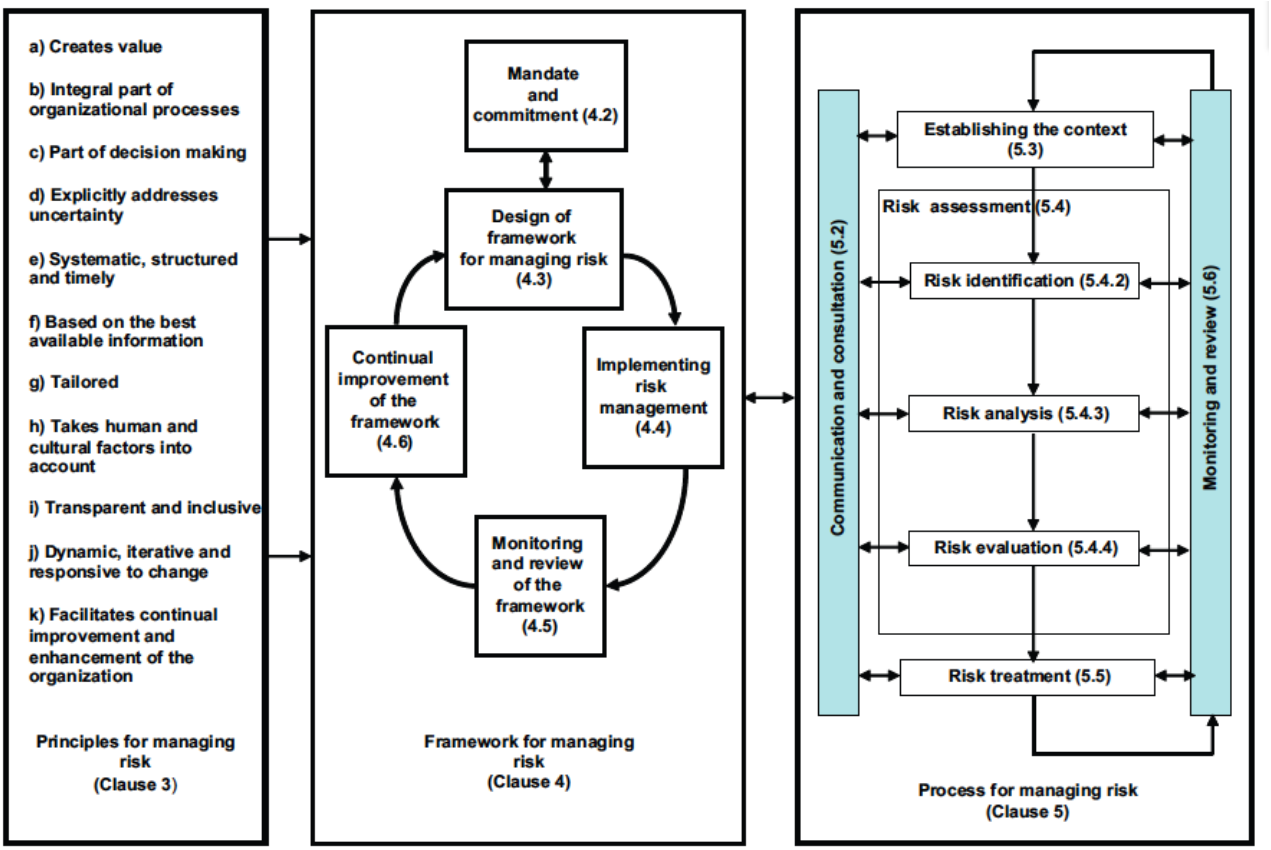

Figure 2.6: Details of the ISO 31000 process

Source: ISO 31000, 2009.

The nine pillars of the ERM domain construct were derived from ISO 31000 (2009). These nine pillars form the mileposts of categorising the initial item pool and were extracted from the detailed process depicted in Figure 2.6. The pillars are described in more detail in the following sections.

2.5 PILLARS OF THE ERM DOMAIN CONSTRUCT

2.5.1 Mandate and Commitment (M&C)

This dimension of ERM measures the mandate and sustained commitment demonstrated by management of the organisation to introduce and ensure continued effectiveness of risk management. It addresses how management sets the tone for commitment to risk management in

the organisation by means of alignment with strategic objectives, assigning risk management accountability, responsibility and performance measurement, and ensuring that the necessary resources are available for risk management.

2.5.2 Framework Design (FD)

This dimension of ERM measures the design and establishment of the risk management framework. Important components comprised in risk management framework design include establishing the risk management policy, ensuring accountability, authority, competency and controls for risk management throughout the organisation, effective and efficient integration of risk management into organisational processes and allocation of appropriate resources for risk management.

2.5.3 Establish Context (EC)

This dimension of ERM encompasses the first step of risk management implementation, i.e. evaluating and understanding the organisation and its context and putting into practice elements of Framework Design. This includes measuring the organisation's articulation of its values, objectives and resources and taking cognisance of internal and external parameters when implementing risk management and defining risk criteria such as risk appetite and the risk model.

2.5.4 Risk Assessment (RA)

This dimension of ERM measures the organisation's risk assessment framework as applied in practice, including risk identification, risk analysis and risk evaluation.

2.5.5 Risk Treatment (RT)

This dimension of ERM measures the organisation's process to select, prepare and implement treatment plans, mitigation measures and controls addressing risks, for example, by utilising the '4 Ts' of risk response: Tolerate, Treat, Transfer or Terminate.

2.5.6 Risk Monitoring and Review (RM&R)

This dimension of ERM measures the organisation's risk monitoring, control and review procedure for the operational components of the risk management process including risk assessment and risk treatment.

2.5.7 Framework Monitoring and Review (FM&R)

This dimension of ERM measures the organisation's monitoring and review process for the risk management framework in both an internal and external context, ensuring that the risk management plans and policies are being followed and that risk management continues to be appropriate, effective and supportive of organisational performance.

2.5.8 Communication and Consultation (C&C)

This dimension of ERM measures all aspects of the organisation's internal and external consultation, communication and reporting around risk management, and the iterative process conducted to provide, share or obtain information and engage in dialogue with stakeholders regarding the organisation's management of risk.

2.5.9 Continual Improvement (CI)

This dimension of ERM measures the organisation's process for continual improvement of the risk management policy, plan and framework.

2.6 RISK MANAGEMENT AND CORPORATE GOVERNANCE

Arena et al. (2010) highlighted the linkage between the rise of risk management and ERM and the increase in global corporate governance due to the business scandals and financial crises that have arisen since the 1980s. According to Arena et al. (2011), the phenomenon was in part attributed to the increase and interplay of both individualism and global connectedness, allowing the magnitude of financial disasters to demonstrate the current risk society for all the world to see. This is analogous to the previously discussed VUCA world, whereby in the example of some of the rogue trading disasters, certain individuals with a high-risk appetite could manipulate a global financial system to take inordinate risk.

New codes of practice and regulation were created which strongly incorporated risk management language and guidelines as far back as 1992 with the Cadbury Code in the UK (Cadbury, 1992), followed by the Turnbull Report (Turnbull Committee, 1999). A second wave of financial scandals beginning in 2000, such as the famed Enron collapse, paved the way for the Sarbanes-Oxley Act (USA Congress, 2002) in the United States of America (USA). As of 2015, insurers in the USA are required to complete an “Own Risk and Solvency Assessment” (ORSA), whereby their summary reports are to include, among other components, a description of the insurer’s “risk management framework”, and the insurer’s assessment of its “risk exposure” (Hoyt & Liebenberg, 2015).

The relevant corporate governance code for South Africa is King III (King, 2009) currently being revised for the next iteration to be released in 2017, King IV. King (2009) referred frequently to risk management[19] and mandated that Johannesburg Securities Exchange (JSE) listed entities conduct formalised risk management and have a risk committee.

These increases in governance have fuelled the growth of risk management and led to criticism by some authors. In his article titled, *The Risk Management of Everything*, Power (2004:7), referred to the numerous claims of benefits and advancements made at that stage with regards to risk management. Power (2004:7) stated that “time may show that risk management is more like the

[19] Almost half of the pages of the report include the word “risk”.

latest management fad than a timeless panacea. And there is a darker side to these developments than is often apparent." Here he referred to legislation and hyper-internal control leading to "corporate regulatory overload".

2.7 MEASUREMENT OF ERM

2.7.1 Introduction

In its historical development within the literature, ERM has been measured in many ways, beginning with the rather simplistic. For example, ERM measures have included whether a company demonstrates a Chief Risk Officer (CRO) appointment (Liebenberg & Hoyt, 2003) based on secondary data. This proposition was expanded on by Beasley, Clune and Hermanson (2005) to include media and database reporting on ERM-related behaviour, such as whether a company's published annual reports refer to ERM. The concept of an ERM maturity index was also proposed based on theory surrounding an organisation's "ability to achieve its objectives relative to strategy, operations, reporting and compliance" (Gordon et al., 2009:309).

In their review of ERM measurement instruments, Kimbrough and Componation (2009:22) found "a wide range of approaches and a discipline in its infancy". Gordon et al. (2009:309) were more critical and stated that "discussions of ERM are generally devoid of any specifics on how to quantitatively measure the concept". Despite the first semblance of ERM measurement tools being published in 2001, the ones found in the literature review were determined to be largely subjective and disparate. These are discussed below.

2.7.2 ERM measurement prospects

Enterprise risk was defined by Dickinson (2001:361) at the highest level as "the extent to which the outcomes from the corporate strategy of a company may differ from those specified in its corporate objectives". He referred to a risk profile arising "from the various factors that impact on the activities, processes and resources chosen to implement the strategy" as potentially forming the basis of a measurement of enterprise risk as illustrated in Figure 2.7 below.

Figure 2.7 is important to the discussion on ERM measurement as it illustrates the points in the ERM process where measurement can take place, for example in assessing the choice of activities and processes, or the evaluation of external factors. Each of these activities can affect the ERM implementation and ultimately the performance of the organisation.

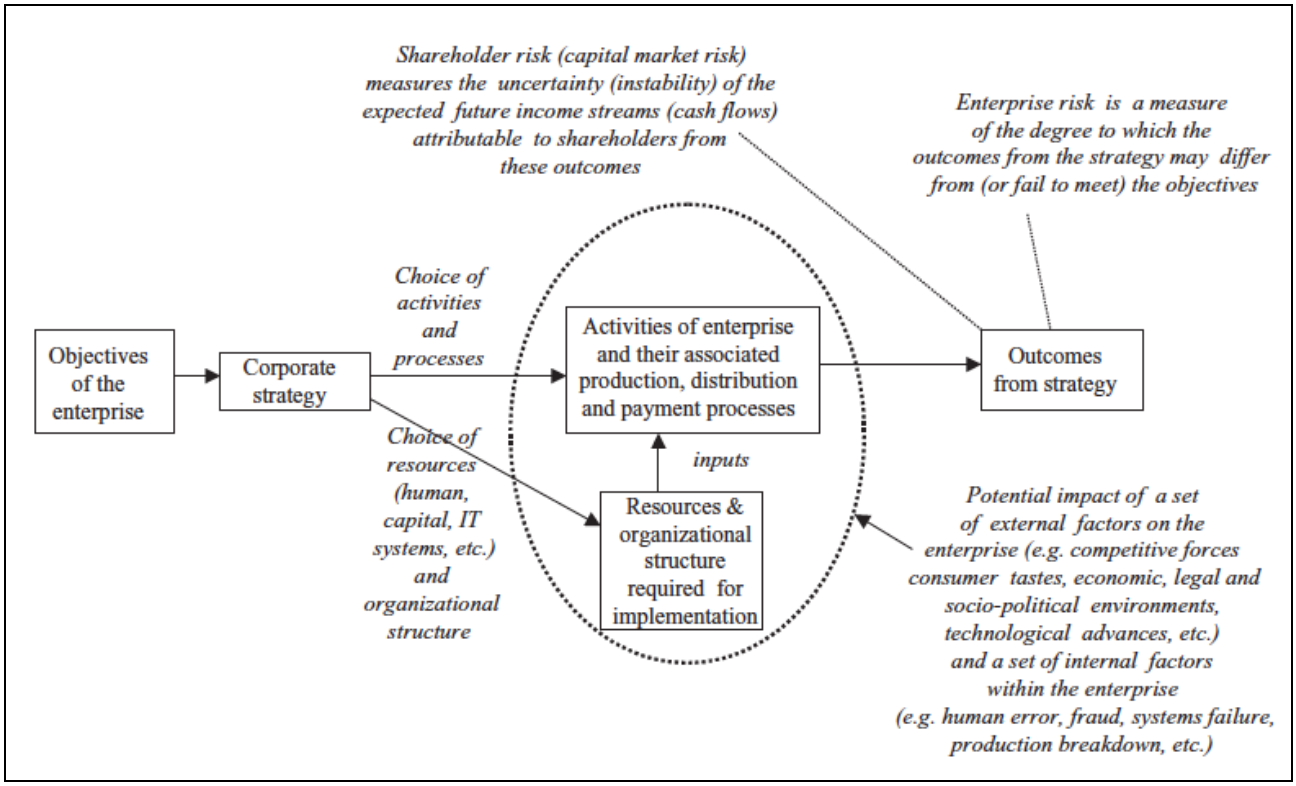

Figure 2.7: Measuring enterprise risk

Source: Dickinson, 2001.

To go the step further of attempting to find empirical evidence of the impact of ERM on the value of organisations (if any), one must first be able to measure ERM. Hoyt and Liebenberg (2011) were among the first researchers to pursue this agenda as well, building on their initial CRO research (Liebenberg & Hoyt, 2003). Their methodology followed the earliest processes of finding an ERM measure, in their case through extending the concept of utilising media and database reporting (secondary data) on risk management as outlined above. The approach of examining this secondary data for potential measurable ERM variables was rudimentary, but formed an initial basis for further empirical examination of secondary ERM data together with a variable such as Tobin's Q as proxy for firm value. Concluding their analysis of these first ERM value measurement results, Hoyt and Liebenberg (2011:816) determined, that "the ERM premium is statistically and economically significant".

As discussed in further detail below, utilising large quantities of secondary data for quantitative analysis in an econometric approach is one side of the ERM measurement medallion; the other is understanding the organisational behaviour and using primary data collection methods, such as surveys and interviews, to determine more qualitative or self-reported measures of ERM's value. In terms of broadening the reach of empirical ERM studies towards the collection of primary data, Mikes and Kaplan (2015:38) stated that "large-sample cross-sectional studies focus on the adoption of a particular risk management framework (for example, COSO's ERM), but ignore how

the framework was implemented by the organization's leadership and employees". It is proposed that researchers provide "a more comprehensive specification of ERM and identify the parameters that could serve as a solid foundation for a contingency theory of ERM design and implementation". Development of a broad sub-set of items measuring ERM values (primary data) as proposed in this study could form the foundation for such research.

Because "discussions of ERM are generally devoid of any specifics on how to quantitatively measure the concept", Gordon et al. (2011:309) proposed an Enterprise Risk Management Index (ERMI) comprised of indicators that are utilised to collect secondary data on firms to investigate their utilisation of ERM in relation to performance. These four measures are based on COSO (2004) objectives as follows:

- Strategy;
- Operation;
- Reporting; and
- Compliance.

As in other business and management sciences, a certain tension exists between ERM practitioners and academics, adding to the challenge of scholarly measurement of ERM. ERM measures do exist in industry, such as the risk maturity indexes promulgated by Aon and Standard & Poor's (S&P) previously referred to. However, in cases where academics have utilised such measures in their studies, they indicated that the theory and methodology of these measures had not been subjected to peer-reviewed publication, and might not provide the requisite academic rigor to support their use in this context.

McShane et al. (2011:645) were the first researchers to bridge this gap by utilising an industry measurement instrument (S&P's ERM scores) in peer-reviewed research that they themselves referred to as "novel". McShane et al. (2011:42) clearly indicated that there simply was no empirical ERM construct to be found in the literature, and "trade and business publications directed at top management are full of articles related to ERM, yet academic research in the area is still rare. We believe that one main roadblock to this research is the difficulty in developing a valid and reliable measure for the ERM construct" (McShane et al., 2011:642). Furthermore, "one main constraint that limited research in this stream was the lack of an effective proxy for the degree of ERM capability and implementation" (McShane et al., 2011:653), and thus the author utilised S&P's ERM maturity index in spite of its lack of academic peer-review status.

McShane et al. (2011) justified this by pointing out that S&P developed a comprehensive risk management rating as a component of its overall rating of insurance companies since 2007. After a long motivation for the selection of this independent variable, the article reached the conclusion that the practitioner's (S&P's) construct is significantly more robust than any other ERM proxy utilised in the literature until that point, especially with regards to capturing the extent of ERM

implementation. “This rating is a sophisticated and comprehensive index that assesses the risk management culture, systems, processes, and practice” according to McShane et al. (2011:642). Whilst that could perhaps be considered reasonable, the theory and methodology behind the S&P’s index has simply not been subject to peer-reviewed publication. The methodology followed was not the ‘classical’ business and management scale and construct development process as proposed in this dissertation. McShane et al. (2011) called for more cross-disciplinary research on ERM and conceded several limitations in the findings, some of which were considered endogeneity[20] issues by later researchers of ERM. McShane et al. (2011:645) even questioned whether their “results indicate a problem with S&P’s evaluation or the ERM construct itself” (McShane et al., 2011:653). As such, utilising an industry promulgated ERM maturity index does not fully present a properly sound and empirically-validated academic foundation. This highlights a continued gap in the research in this area and presents an opportunity for the development of a measurement tool – the key contribution of this dissertation.

The contribution by McShane et al. (2011) piqued interest in practitioner and academic collaboration in the field of ERM. Another industry measurement tool was tested for empirical validity by an academic institution. The multi-national corporation (MNC) Aon, a risk consultancy, partnered with The Wharton School of the University of Pennsylvania[21] on a study of financial performance and the insurance industry “award-winning” Aon Risk Maturity Index. The partners released a report where “The Wharton School determined a statistically-significant relationship between the organization’s (Aon’s) risk maturity rating and financial performance” (Aon, 2015). However, similar to the S&P case, the details of the actual firms and scores were not made available to the academic community and in the case of the Aon study, nor the actual methodology.

Utilising a dependent variable for testing statistically-significant relationships between ERM and an organisational performance indicator for “value” was the next step in the development of the ERM measurement literature. It is important to note that in the study by McShane et al. (2011), the use of S&P’s maturity index as a more comprehensive ERM independent variable and Tobin’s Q as dependent variable to measure the financial success of an organisation, provided the next pronounced step to quantify the effect of ERM’s value, after Liebenberg and Hoyt’s (2003) first attempt. As elaborated on above, Hoyt and Liebenberg (2011) further developed their research, along with other authors following this direction. Florio and Leoni (2017) augmented the previous ERM value measurement research by means of secondary data, finding that “firms with advanced

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[20] Endogeneity in the context of ERM implementation can refer to ambiguity around causality between two variables, e.g. between ERM implementation and firm value – if firm value is high measured in terms of profitability, it can be ambiguous whether higher profitability leads to higher ERM or *vice versa*, i.e. firms do not randomly adopt ERM. See Florio and Leoni (2017) and Bromiley et al. (2015) for more detailed explanations.

[21] Prof Ittner of Wharton, involved in the AON research project, confirmed that the AON instrument was “empirically validated” by Wharton, but remained a proprietary instrument of AON and could not be shared.

levels of ERM implementation present higher performance, both as financial performance and market evaluation. Additional tests also corroborate the expectation that effective ERM systems lead to higher performance by reducing risk exposure" (Florio & Leoni, 2017:1).

As discussed earlier in this chapter, Woods (2009), Arena et al. (2010) and Mikes (2009) followed different ERM research streams, examining practical examples and case studies of ERM implementation in firms in qualitative studies which provided strong practical insights, but did not measure outputs in a quantitative manner that could be replicated in other studies. They did not allow representation of an ERM measure as a variable with which to make empirical measurements.

Beyond the studies of Altuntas et al. (2011) discussed above, and Kimbrough and Componation (2009) discussed in Section 2.8 on risk management culture below, Gates et al. (2012) provided the only other academic (peer reviewed) study to explore a concept of a structured primary data collection and analysis approach towards empirical ERM measurement and construct development (as of the date of the submission of this dissertation). All of the studies, whilst forming significant and fundamental contributions to this dissertation, which extend the research stream of ERM measurement through primary data, show shortcomings in relation to the perspective of 'classical' management sciences empirical scale and construct development theory. Altuntas et al. (2011) developed specific ERM items for the study, driven by the five ERM model components. However, they reported a snapshot of findings on item responses only, without further determining exactly what the constructs measure or testing them against other variables.

Gates et al. (2012) did not develop a theory-driven new primary data collection instrument, i.e. their own empirical ERM measurement scale based on a defined construct domain. Rather, they utilised the responses from an existing Conference Board of Auditors in collaboration with Marsh (risk consulting MNC) study, querying a variety of issues around strategy and risk to US audit committee members. Responses to questions related to the ERM domain were transcribed from the survey as items clustered in groups around key COSO (2004) themes, and subjected to empirical analysis in an attempt to measure their effect by means of hypothesis and Partial Least Squares (PLS) testing, a method for testing statistical relationships between variables. This data was gathered from ERM practices and values statements completed by executives of listed companies and the existing survey questions transcribed into the specific risk management variables (items) based on components of the COSO (2004) framework.

Gates et al. (2012) thus represented the first real attempt to develop and test constructs or dimensions based on the COSO ERM framework. These constructs represented an empirical measure for ERM that can be tested for statistical relationships with other variables, based on primary data collection. Their exploratory study was the first ERM research to document the value equation of ERM and explicitly link the importance of the components of an ERM framework.

The survey items were clustered around the following six components of the COSO (2004) ERM framework:

i) Objective setting;
ii) Identification;
iii) Risk reaction;
iv) Oversight;
v) Information and Communication;
vi) Internal environment.

Furthermore, data were collected on the firm's management and performance. The study then tested hypotheses around the relationship between the latent variables that comprised the items, most of which were highly correlated.

According to Fraser and Simkins (2010:432), who commented on a working paper of the study, the findings indicated that "the ERM stage, a good ERM environment, better top-down and bottom-up communication of ERM missions, and explicit risk tolerance levels, positively influenced better decision-making".

Unfortunately, as indicated above, a notable gap in the research by Gates et al. (2012) was that the survey instrument was not explicitly designed for the comprehensive measurement of ERM items. It did not begin with a review of the theory and literature of ERM (definition of the construct domain), so some of the pillars of the COSO (2004) framework are not even covered in the data collected. ERM items extracted from existing statements (items) in the survey were forced to fit the COSO pillars selected where possible. In its construct selection, the study thus neglected the broader ERM academic literature and ERM frameworks other than COSO, such as ISO 31000.

Even given these limitations, the results of the study were promising, with a positive correlation demonstrated between the COSO constructs and an organisation's internal environment, as well as support for the explanatory power of some ERM constructs towards adding value to the organisation. Questions were raised[22] about the study, such as whether it is necessary for the "synthetic constructs" of ERM based on COSO (2004) to demonstrate linear association.

The efforts of Gates et al. (2012) provided one of the main points of departure for this dissertation. As detailed in Chapter 3, this dissertation builds on the existing research by extending the concept of directly collecting primary data for an empirical ERM measurement instrument. A Likert scoring scale for empirically measuring items representing components (constructs) of ERM was applied in this study. This study also built on Gates et al. (2012) and the previous ERM research by going further in terms of utilising and validating items developed *specifically* for the measurement of ERM. The first step in this process was identifying those items most critical to the successful

[22] The researcher is grateful to one of the authors of the Gates (2012) study, Prof Paul Walker, who gave

implementation of ERM (success factors), so that the theoretical domain construct and its potential factors could be defined and measured empirically. This was a pre-requisite to be able to establish empirically the nature of relationships between these factors and other variables, such as culture or firm value. As further elaborated on in the methodology section in Chapter 3 below, this study's primary contribution is the development of an instrument (scale) specifically designed to empirically measure ERM. It does this by incorporating the body of practitioner and academic literature into a clear and well-defined ERM construct domain, which is in turn represented by a pool of items (manifest variables), distilled from the literature.

2.7.3 Summary on the measurement of ERM

The preceding sections have discussed several comprehensive reviews of the ERM literature. These have provided a detailed appraisal of the risk management canon, and homed in on a number of key ERM studies. Several researchers in the accounting, finance and management sciences disciplines, most notably Kaplan (2011), McShane et al. (2011) and Bromiley et al. (2015) have bemoaned the lack of an effective empirical methodology for measuring risk, risk management and ERM. Paape and Speklé (2012) lamented that a main roadblock to academic risk management research is the difficulty in developing a valid and reliable measure for a risk management construct, i.e. a proxy that can act as a variable within empirical studies examining measurement of ERM. The lack of an empirically-validated ERM measurement scale, which incorporates the constructs that comprise the broad spectrum of ERM components (the theoretical ERM domain construct), limits the prospects to assess ERM's effectiveness as a management instrument.

The main goal of the dissertation is to address this research problem of the lack of an empirical ERM measurement instrument. The literature review has provided a view on the current status of ERM within academia and practice, focusing on the development of ERM measures (and the lack thereof). It acts as a point of departure for building on the theoretical foundation of ERM and defining the boundaries of the ERM domain construct. The findings of the key studies reviewed on the development of primary data collection instruments for ERM measurement, most prominently Altuntas et al. (2011), Gates et al. (2012) and Kimbrough and Componation (2009), are built on in the methodology of this study in Chapter 3.

The next section, (2.8) transitions to the culture component of ERM, and provides a more detailed review of this specific and critical ERM topic. It leads to the identification of a possible set of independent variables with which to test and cross-validate an ERMVs measurement scale and its construct(s).

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feedback on the article journal submission and review process.

2.8 RISK MANAGEMENT CULTURE, ATTITUDES AND VALUES

2.8.1 Introduction to ERM culture

This chapter began by reviewing the body of literature of risk management and a discussion of Knight's (1921) view on the mechanistic and organic domains of risk, whereby mechanistic and organic decision-making processes play a prominent role in defining, what is effectively the risk culture of the organisation. As highlighted in Section 2.4, Altuntas et al. (2011:419) concluded that risk management culture is a key component of ERM implementation, in fact a "precondition for a successful risk strategy is an effective risk management culture". In management theory and empirical studies, according to Altuntas et al. (2011), there is a strong link between corporate culture and success. Therefore, in the study by Altuntas et al. (2011), risk management culture formed one of the pillars of the primary data collection instrument, in order to measure the state of ERM implementation within the firms in that study. Bromiley et al. (2015) added that "whether corporations actually have consistent risk cultures and appetites is an empirical issue meriting consideration".

Paape and Speklé (2012) highlighted the pronounced gap between academia and practice in risk management, which this dissertation strives to address. They noted that ERM adoption is influenced by factors such as regulatory environment, internal factors, ownership structure, and firm and industry characteristics. Whilst these factors (the factor categories, not the actual individual effects of the influencers) are similar across different national contexts, Paape and Speklé (2012) noted that cultural factors themselves, including culture differences in private and public-sector organisations could be a condition of ERM adoption. Building on the contribution of Mikes (2009) discussed below, Paape and Speklé (2012) clearly pointed towards the importance of investigating culture as a potential mediator of risk management values influencing implementation. Cross-validation of the ERM values constructs with culture values dimensions is a secondary contribution of this dissertation discussed in further detail at the end of this chapter.

Bromiley et al. (2015) called for the evolving discussion about ERM to be informed by relevant work in management on risk, strategy management, organisational change and other relevant topics. According to Bromiley et al. (2015:265), "academic research on ERM is still in its infancy, with articles largely in accounting and finance journals, but rarely in management journals". These authors considered "managers' conceptualisation of risk" to be a particularly important area of academic research focus on ERM. Risk concepts can (and most probably do) vary dramatically across parts of an organisation and even more so between organisations.

Furthermore, the managerial concepts of risk need to be better understood to have more productive conversations between scholars and managers. One of the best ways to do so, is to ask managers directly about their values, by collecting primary data. According to Bromiley et al. (2015:269-270), "To study how managers measure risk requires the development of scales that assess how managers measure risk", and "surveys can help more systematically elicit dimensions

considered by managers in their evaluation of risk". This approach is reflective of the one taken in this dissertation – in the ERMVS, managers are asked to consider their organisations in responding to questions about their personal values towards ERM critical success factors.

Power (2009) was a critic of some core elements of ERM. In particular, he argued that ERM's rational and quantitative culture (with specific reference to the concept of 'risk appetite' promulgated by the best practice frameworks, such as COSO) is a source of intellectual failure. He argued that risk appetite should not solely be a thing to be measured; instead, it should be recognised as "a dynamic construction involving values and the situational experience of a multitude of organizational agents" (Power, 2009:854). In his 2009 article purposefully and controversially titled, *The risk management of nothing*, Power presented an argument that ERM is "a boundary preserving model of risk management subject to 'the logic of the audit trail', rather than a boundary challenging practice which confronts and addresses the complex realities of interconnectedness" (Power, 2009:849). He promulgated a view of ERM that focuses more on human behaviour than calculations of capital, and includes "a more critical imagination of alternative futures". In other words, he stressed the need for a view that places a greater emphasis on scenario planning, and takes into account the systemic nature or interconnectedness of risks. This contrasts a 'tick box' compliance approach that may leave management with a good feeling that risk has been squared away, while in reality, the difficult questions about risk had not been asked. As a possible avenue for improving the efficacy of ERM, Power (2009) suggested to look towards business continuity management (BCM), precisely because it is premised on the interconnected nature of commercial life. BCM covers all areas of the business and the external landscape – suppliers, partners and other stakeholders, realising a true nature of embeddedness.

In summary, Power (2009) argued that people and organisations have different preferences when it comes to risk, which cannot be captured in accounting and auditing type logic. Power's prominent point is central to this dissertation, which focuses on ERM values towards the key theoretical and practical implementation criteria of ERM, represented by a scale and constructs to measure ERM values empirically. Power (2009) alluded to the potential mechanistic and organic components of ERM in terms of the 'tick box' approach that COSO (2004) was criticised for. Paape and Speckle (2012:536) called this out directly when then stated: "…neither do we find support for the mechanistic view on risk management that is implicit in COSO's recommendations on risk appetite and tolerance." In Power's (2009) discussion of "Risk Appetite", he presented the consideration that decisions in the face of risk are potentially organic, and subject to framing and biases. In fact, he concluded that "the actions of different members of an organisation may reveal different attitudes toward risk" (Power, 2009). Capturing the attitudes or values of managers towards the main items (manifest variables) comprising the bulwark of ERM theory, practice and implementation (including the concept of risk appetite itself) would thus provide a critical step in the empirical measurement of ERM constructs. Building on this point, it is again important to note, that

the ERMVS measurement instrument emanating from this dissertation is designed to elicit responses of different managers in an organisation concerning their values towards key ERM success factors. They are to take into account their organisational context, but respond in terms of their personal values towards ERM.

Arena et al. (2010) advanced the conceptual reasoning of Power (2009), finding that risk management mediators act as both localisers and globalisers in their organisations. They translate the cultural framework across the organisation's networks. Depending on how much power they are afforded from the decision-making centre, they bring in a globalised perspective to the organisation with respect to risk management. A globalised corporate risk management perspective, could be considered more organic, and less mechanistic; thus, measuring values of managers towards each of the ERM components (items or manifest variables) provides an excellent lens on the aspects or dimensions that comprise the overall ERM construct domain.

Mikes (2011) further explored the effect of culture in a qualitative study homing in on several case studies, and presented a comprehensive discussion of the effect of organisational culture on ERM. She specifically explored the concept of calculative cultures in the banking sector. Some banks feature "quantitative enthusiasts" who enjoy "risk management by the numbers", and others are comprised of "quantitative sceptics," in other words managers who favour "softer instrumentation" and risk management that is qualitative and "holistic" in nature. According to Mikes (2011:230):

> *Risk management has its own cultural cartographers. Some draw the boundaries of risk management to encompass only 'measurable' risks, others make claim on the control of uncertainties for which reliable measurements do not exist and may never be found. Risk practitioners skilfully apply scale both to 'zoom in' on differentiations within risk management and to provide an aerial view of risk management's place on the map of organizational expertise.*

This application of scale, as outlined, may lie either with a preference for the quantitative or the qualitative – "counting" risks as opposed to "envisioning" them.

With regards to ERM playing a role in influencing the organisation, its decision-making, and thus its overall culture, Meidell and Kaarbøe (2017:40) "understand the ERM function as sense-givers that vertically and horizontally influence meaning construction among decision-makers in the organization". As was previously alluded to, the business and management sciences literature has outlined the strategic battle for the centre, or control, of the organisation. Not only do risk practitioners in positions such as CRO attempt to influence organisational strategy, but "risk managers, like many other occupational groups, particularly those wishing to be seen as 'professions' therefore can be expected to engage in ideological rhetoric and boundary-work, in order to stake claims over particular kinds of work" (Mikes, 2011:229). In other words, they try to create a certain mystique or power around their function. In fact, in the Mikes (2011:240) study, at one of the banks, risk managers were deemed to have "constructed the *legitimacy* of risk-based

performance management". Furthermore, "the allocation of risk capital turned out to be as much a political process as other forms of budgeting were" (Mikes, 2011:232). Again, these examples evidence that it is critical to understand and find an instrument for measuring the *values* of executives, managers and employees of the organisation with regard to these ERM issues.

As one of the most direct threads of the literature connecting ERM and culture, Kimbrough and Componation (2009) conducted a study of audit executives on the relationship between organisational culture and ERM. Their study is the third example in the ERM literature of research featuring the development of a measurement instrument based on collection of primary data. It focused on a culture measurement instrument, the Organizational Culture Assessment (OCA). The OCA is a primary data collection instrument based on value scales developed by Reigle (2003) for measuring an organic-mechanistic culture model in an organisation. In the Reigle (2003) model, an organic culture exhibits more openness and collaboration. For the ERM variable, Kimbrough and Componation (2009) developed their own scale to measure an organisation's percentage implementation of key ERM elements (ERM process components) based on primarily the COSO (2004) and ISO 31000 (2009) standards, whereby a more COSO-orientated nomenclature was utilised in their study. These elements act as a type of ERM "Maturity Index" across ERM implementation aspects, and are similar to the pillars of the ERM domain construct identified in this dissertation as presented in Section 2.5. The theoretical ERM domain construct of Kimbrough and Componation (2009) is not as comprehensive as the one provided in this dissertation, and it should be noted that the ERM elements in their study measured organisational practice, and not values of managers. The difference in collecting data by means of a scale and testing on how managers value the ERM domain construct (i.e. this study), as opposed to how they believe it is being implemented in the organisation (Kimbrough and Componation, 2009) is material and provides different perspectives towards the measurement of ERM. The Kimbrough and Componation (2009) sample was comprised of managers from an industry body in audit functions with exposure to ERM from various countries and industries.

Kimbrough and Componation's (2009) study found evidence of a statistically-significant relationship between the level of ERM implementation in the respondents' organisations and the respondents' scores on the OCA. Scores were positively correlated indicating that the higher percentage of implementation of ERM, the higher the OCA score (organic organisational culture). Though to determine exact cause and effect would be speculative, a statistical relationship between organic cultures and ERM implementation was established, "the results were correlated, and the analysis supports the hypothesis that organic cultures tend to make greater progress in their ERM programs" (Kimbrough & Componation, 2009:18). This led to theorisation that, because organic cultures are presumed to have a greater capability to deal with change, they would be more comfortable in adopting a shift in management such as ERM implementation.

The Kimbrough and Componation (2009) study demonstrated a methodology whereby primary data were collected to determine the relationship between an ERM measure (ERM maturity) as a dependent variable and a culture measure (OCA) as an independent variable. Again, the study emphasised that it is important to consider culture and values in the dissertation's ERM measurement instrument – in fact, it highlighted the need for the ERM measurement instrument to be values focused. The conclusions of Kimbrough and Componantion (2009) pointed to an organic organisational culture being desirable for ERM deployment and this being linked to advanced ERM deployment. However, there were nuances in the interpretations, which suggested that further research would need to address the cause and effect (or endogeneity, as previously discussed) issues. Questions arise, for example: "Does an organic culture cause a superior ERM implementation?", or "Is the organic culture a result of an advanced ERM implementation?" These results can be tied back to the original discussion of Knight (1921) at the beginning of this chapter on risk, where the view was presented that aspects of an organic approach are required to deal with the subjective aspects of risk and uncertainty. According to the literature, this translates directly to effective enterprise risk management practice and implementation.

As discussed above, it is very interesting to note how important an issue like culture is to a discipline such as ERM in the business and management sciences literature. It is clear, that culture comprises a critical aspect of ERM that must be considered in the dissertation's empirical ERM measurement instrument. The methodology discussion in the next chapter (Chapter 3) will explicate the demarcation of the theoretical construct domain of ERM and the items and constructs or dimensions that a scale comprises which can be utilised to systematically measure values towards ERM concepts as indicated above. As is explained in Chapter 3, a final step to be considered in the construct development process is cross-validation – for which an appropriate independent variable must be selected. Since the proposed ERM scale will measure ERM values constructs, appropriate cross-validation measures considered in this study include other values constructs or dimensions such as culture (NC). Examples of these are discussed in the following section.

2.8.2 National culture and risk management in organisations

In the review of the ERM literature and following the thread of risk management culture, Zwikael and Ahn (2011:32) discussed in detail the effect of national culture (NC) on project risk attitudes, concluding that the GLOBE NC dimension of Uncertainty Avoidance (UAI) has a statistically-significant relationship with perceived project risk. GLOBE, and its antecedent the seminal Hofstede Values Survey instrument (VSM-13), are the primary culture measures (scales comprised of dimensions or constructs), acting as variables in empirical studies within the business and management sciences literature.

GLOBE (Javidan, Dorfman, De Luque & House, 2006) defined a group's culture as "shared motives, values, beliefs, identities, and interpretations or meanings of significant events that result from common experiences of members of collectives that are transmitted across generations".

According to Taras, Rowney and Steel (2009), there has been a strong shift towards measuring attitudes and values as the focal point in management cross-cultural literature, developing into a quantitative methodology. Previously, when the study of culture was primarily in the domain of anthropology or archaeology, research featured a more qualitative approach, focusing on external layers of culture and artefacts, languages and traditions.

According to Venaik and Brewer (2010:1 310):

> *Both Hofstede and GLOBE are highly valuable studies on cross-cultural management, with GLOBE being a more recent extension of the Hofstede study. Both culture models are supported by powerful arguments to their validity in terms of citations in the academic literature, and there is no consensus in the research community on which model should be preferred. For this reason, both sources of cultural dimension scores continue to be applied in the literature.*

In the study of Zwikael and Ahn (2011), which represents a strong thread in the literature review linking risk management and culture values, it was a specific finding that New Zealand project managers demonstrated a high level of Uncertainty Avoidance (UAI). As such, these project managers demonstrated a higher perceived level of risk in the project, and furthermore, a heightened awareness and focus on risk management practices. In countries with lower UAI, i.e. countries registering a *lower sense of concern* about ambiguous circumstances and lack of formal rules, such as Japan and Israel, the perceived levels of project risk were lower and as a result, less effort was invested in risk management planning.

The final article reviewed emanating from the ERM literature specifically discussing risk management and culture dimensions was that of Theil and Ferguson (2003). Unfortunately, an ambiguous discussion was provided of cultural variables that were not tested empirically within the study itself. Theil and Ferguson's (2003) study was based on earlier research examining the effect of NC on life insurance penetration by Park (1993), which was elaborated on and investigated more rigorously. The empirical results of the more recent study by Park, Borde and Choi (2002) are discussed below. Theil and Ferguson (2003) also served as a review of the scarce published research in the domain of the effect of NC on various aspects of insurance.

Park et al. (2002) found that national cultural variables significantly influence the level of a country's "Insurance Pervasiveness", a measure of the penetration of insurance premiums defined by the ratio of total premiums to the country's gross national product. Insurance acts as a proxy for risk values of a society – the higher the insurance pervasiveness, the higher the amount of risk and uncertainty people perceive in their lives (i.e. the higher their manifestation of UAI), and the higher the degree of minimisation of these perceived risks through the purchase of insurance rather than

other competing hedging mechanisms. In particular, Hofstede's masculinity/ femininity dimension (MAS) was found to have a statistically-significant relationship with insurance pervasiveness. The study basically defined "Insurance Pervasiveness" as the dependent variable, with Hofstede NC variables and additional control variables as the independent variables. Hypotheses were formulated about the expected relationship between the variables and correlation analysis was conducted. Park et al. (2002: 83) concluded that "particularly the Uncertainty Avoidance (UAI) and the individualism/collectivism (IDV) dimensions can significantly influence the amount of anxiety and risk people perceive in their lives, and consequently influence their behaviours to hedge risk and uncertainty." Park's study utilised a deductive approach, building hypotheses from the theory about NC's effect on insurance pervasiveness. For example, "Hypothesis 1: The higher the degree of uncertainty avoidance in a country's culture, the higher the degree of insurance pervasiveness in that country" (Park et al., 2002:84).

The conclusion of the study by Park et al. (2002) indicated that, despite many anecdotal reports and the expectations of the researchers, the study failed to identify NC as a whole representing a significant factor related to insurance pervasiveness. The scarcity of articles on the topic of NC's effect on risk management and insurance, where the effect of NC on individual risk perception and other business management functions have been researched in more depth, coupled with the inconclusiveness of Park's study, highlights this as an area of interest for further study.

The methodology of the study by Park et al. (2002) influenced the methodological design of this dissertation, in particular with regards to the use of NC dimensions as independent variables to test and cross-validate the ERM values constructs as dependent variables. As is discussed in detail in the methodology chapter to follow, in terms of steps in the development of scales and constructs to empirically measure business and management sciences phenomena (such as ERM values), it is critical to test emerging constructs with similar empirical instruments or measures, i.e. the so-called cross-validation of constructs. The literature has pointed towards culture as an important modifier to be considered in ERM and its implementation. To measure culture, culture values instruments, such as those promulgated by Hofstede and GLOBE, are well established in the literature. Therefore, these instruments are considered valid and reliable measures of dimensions or constructs of culture, acting as independent variables for empirical studies with other measures in the business and management sciences. The methodology of development of the NC values scales and constructs as per GLOBE and Hofstede is very similar to the methodology followed for developing the ERM values scale in this study. As such, the culture dimensions scales assess similar constructs and lend themselves naturally to convergent validity testing as part of cross-validation within this study. Both sets of constructs can be subjected to empirical testing for statistically-significant relationships as independent and dependent variables, with results of correlated constructs indicating convergent validity and thus cross-validating the scale under development.

The dissertation has thus included culture dimensions for the purpose of ERM values construct cross-validation. Selected Hofstede and GLOBE culture values dimensions, in terms of those, which could theoretically exhibit a statistically-significant relationship with the ERM values construct(s), are represented as independent variables. As discussed in the methodology and results chapters (Chapters 3 and 4), these variables were tested to determine whether there are potential statistically-significant relationships between the culture dimensions and ERM values construct(s). Hypotheses were formulated in a similar fashion to the study of Park et al. (2002), to empirically determine whether selected independent NC variables have statistically-significant relationships with dependent variables such as the ERM values construct(s). The hypothesis statements are exhibited in Appendix I. The culture values dimensions are replicated in the main study's sample data set directly from the instruments sourced from the literature, namely the VSM-13 (Hofstede, 2013) and the GLOBE Values Instrument (House, Hanges, Javidan, Dorfman & Gupta, 2004). The selected NC dimensions, the associated hypotheses and the results of the cross-validation testing are discussed throughout the relevant sections of the dissertation. The selected culture dimensions are summarised in Sections 2.8.3 and 2.8.4 below.

2.8.3 Culture: The GLOBE dimensions

Below are summarised the GLOBE culture dimensions selected for cross-validation of the ERM values construct(s). [23]

a) Uncertainty avoidance (G-UAI)

This is a measure of a culture's preference to exist in a structured system stressing formalised procedures, orderliness and consistency.

b) Power distance (G-PDI)

This dimension reflects the extent to which a culture accepts and endorses authority, power distances and status privileges.

c) Performance orientation (PO)

This reflects the extent to which the culture encourages and rewards innovation, high standards and performance improvement, i.e. the drive for success.

d) Future orientation (FO)

This shows a culture's prioritisation of past, present and future, – in particular how a culture encourages and rewards future-orientated behaviours, such as planning and delaying of gratification.

e) Collectivism 1 (COL)

This dimension assesses whether group loyalty is emphasised at the expense of individual goals, whether the economic system emphasises individual or collective interests, whether being

[23] Summarised from House et al. (2004).

accepted by other group members is important, and whether individualism or group cohesion is valued more in the society.

2.8.4 Culture: The Hofstede dimensions

Below are summarised the Hofstede culture dimensions selected for cross-validation of the ERM values construct(s).[24]

a) Uncertainty avoidance (H-UAI)

This is a measure of a culture's attitudes towards time, future, uncertainty and anxiety and the extent to which the members of institutions and organisations within a society feel threatened by uncertain, unknown, ambiguous, or unstructured situations – summed up as ambiguity, i.e. ambiguity perturbs members of high UAI cultures.

b) Power distance (H-PDI)

This dimension indicates a culture's perceptions on human inequality in domains of prestige, wealth and power and the extent to which the less powerful members of institutions and organisations within a society expect and accept that power is distributed unequally. Mearns and Yule (2009:783) found that H-PDI has a statistically-significant relationship with risk-taking at work.

c) Long-term Orientation (LTO)

Long-term orientation stands for a society which fosters virtues orientated towards future rewards, specifically, adaptation, perseverance and thrift. Short-term orientation stands for a society which fosters virtues related to the past and present, in particular, respect for tradition, preservation of 'face', and fulfilling social obligations.

d) Monumentalism (MON)

Monumentalism stands for a society who rewards people who are metaphorically speaking like monuments: proud and unchangeable. The opposite pole, Self-Effacement, stands for a society who rewards humility and flexibility.

e) Individualism (IDV)

Individualism is the opposite of Collectivism. Individualism stands for a society in which the ties between individuals are loose: a person is expected to look after himself or herself and his or her immediate family only. Collectivism stands for a society in which people from birth onwards are integrated into strong, cohesive in-groups, which continue to protect them throughout their lifetime in exchange for unquestioning loyalty.

f) Masculinity (MAS)

Masculinity is the opposite of Femininity. Masculinity stands for a society in which social gender roles are clearly distinct: men are supposed to be assertive, tough, and focused on material success; women are supposed to be more modest, tender, and concerned with the quality of life.

Femininity stands for a society in which social gender roles overlap: both men and women are supposed to be modest, tender, and concerned with the quality of life.

Examples of hypothesis statements for the culture values dimensions acting as independent variables for cross-validation of a dependent ERM values construct are listed in Table 2.2.

Table 2.2: Examples of culture hypothesis statements

Cultural dimension	Dimension description	Hypothesis
GLOBE: Uncertainty Avoidance (UAI)	Measures a culture's preference to exist in a structured system stressing formalised procedures, orderliness and consistency	High UAI-G cultures will demonstrate greater emphasis on ERM and a desire for more structured risk management frameworks
Hofstede: Power Distance (PDI)	Indicates a culture's perceptions on human inequality in domains of prestige, wealth and power	Cultures scoring high in PDI will demonstrate an approach to ERM that is driven top-down through the company hierarchy
GLOBE: Performance Orientation (PO)	Reflects the extent to which the culture encourages and rewards innovation, high standards and performance improvement, i.e. the drive for success	High PO cultures will demonstrate ways of measuring ERM performance such as key performance indicators (KPIs) throughout the organisation

The full set of hypotheses is included in Appendix I, and the results of the empirical culture dimension and ERM construct(s) cross-validation tests are discussed in Chapter 4.

2.9 CONCLUSION

Enterprise risk management is a multi-disciplinary business and management sciences field of significant interest to practitioners and scholars. This chapter has provided a review of the risk management literature from within the spectrum of relevant management sciences domains identified, most predominantly finance, accounting and organisational and strategic management. From a strategic management perspective within the management sciences, it is very clear that the objective of the firm is to increase value, and ERM is potentially an important lever to both increase value through the appropriate risk-taking opportunities as well as to limit the downside of risk in terms of losses. The literature review confirmed the assessment of Kaplan (2011), McShane et al. (2011), Bromiley et al. (2015) and others, that there is indeed a significant gap in academic knowledge around the topic of ERM and more specifically, the measurement of ERM. It was concluded, that there clearly is a need for a robust academically-validated instrument that will provide an ERM measurement scale comprising items and constructs that can act as variables for empirical studies.

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[24] Summarised from Hofstede (2013).

It is imperative to provide a proper foundation, i.e. definition of the construct domain to develop and test constructs comprised of a scale of items that can be used in academic studies for the quantification of enterprise risk management values. This chapter provided a broad summary of literature, spanning from practitioner and industry best practice to academic articles from the most appropriate peer-reviewed journals.

The deeper investigation of ERM has led towards the inclusion of theoretical aspects of risk management culture, and organic components of the ERM frameworks, which need to be considered in a study truly considering all aspects of the conceptual construct domain of ERM. As such, the scale of items developed to address the research problem is an *Enterprise Risk Management Values Scale*, which comprises the items (manifest variables) to empirically measure ERM constructs (latent variables).

As is discussed in detail in the methodology chapter that follows, the process of developing an empirically-valid ERM measurement instrument builds on this comprehensive literature review by transposing a comprehensive pool of 224 descriptive statements (potential items/manifest variables) describing aspects of enterprise risk management from within the clearly-defined ERM construct domain. These could be considered key aspects or "critical success factors" of ERM representing the comprehensive theoretical domain construct. The pillars bounding this ERM construct domain's item pool were detailed in this chapter. This item pool is appropriately refined by means of (i) content validity testing via an expert group, and (ii) further testing such as exploratory and confirmatory factor analysis, to develop a valid and reliable ERMVS. Finally, the ERMVS is tested in an empirical component of the study cross-validating the ERM values constructs with NC values dimensions as detailed in the following chapter on the methodology of the study.

CHAPTER 3
RESEARCH METHODOLOGY

Trade and business publications directed at top management are full of articles related to Enterprise Risk Management (ERM), yet academic research in the area is still rare. We believe that one main roadblock to this research is the difficulty in developing a valid and reliable measure for the ERM construct (McShane et al., 2011:642).

3.1 INTRODUCTION

Not much progress has been made in the empirical measurement of the ERM domain construct since the appeal by McShane et al. (2011) quoted above. As was discussed in detail in Chapter 2, the development of a valid and reliable measurement instrument for ERM values is at the crux of this dissertation. Risk culture is central to an organisation achieving the objective of increasing value, and risk culture significantly influences the success of an organisation's implementation of an ERM framework. As thus, it is critical to understand the values of managers towards ERM practices and develop a theoretically and empirically robust ERMVS for measuring these. Correspondingly, this chapter details the research methodology of the study in addressing the broader research problem, questions, and specifically the development of said ERM values measurement instrument.

This chapter begins with a more detailed statement of the research problem and research questions stemming from the literature reviewed in the previous chapter. After a discussion of the issues surrounding the study's research philosophy, the methodology of addressing the research problem is explained in detail. The study follows an empirical approach of 'classical' business and management sciences scale and construct development and testing, which has a long history in the psychology and business and management sciences literature. This chapter lays the foundation and process for all steps in the empirical research methodology, as follows:

i. Development of a broad ERM values item set (manifest variables) reflecting the comprehensive conceptual definition of the broader theoretical ERM values domain construct. This is initially derived from the literature review.
ii. An expert group review of the ERM values item set to determine the items with the greatest content validity and highest importance with regards to the comprehensive set of ERM values statements. This sets up the initial ERM Values Scale (ERMVS).
iii. Development of the pilot/pre-study survey instrument utilised to determine ERM values item (manifest variable) reliability and whether an ERM values first-order construct and second-

order sub-constructs (latent variables) are reflected by the ERMVS (manifest variable item set).

iv. Development of the main survey instrument using test selections to confirm the reliability and validity of the ERMVS and confirm the factor structure. These tests examine the validity and reliability of both the scale (items) and constructs, as well as the statistical relationships (if any) between variables.

v. The scale and construct(s) are also cross-validated by testing them with related culture values constructs from the literature, as well as demographic variables, to determine whether there are statistically-significant relationships (correlation) between these variables. In this case, the ERM values constructs represent the dependent variable, and NC values dimensions/constructs and demographic factors represent the independent variables for testing.

In summary, this is the development of an empirically-tested valid and reliable Enterprise Risk Management Values Scale (ERMVS), which allows scientific measurement of ERM values constructs. These constructs should appropriately represent a clearly-defined theoretical ERM values domain construct. As pointed out in the first two chapters of the dissertation, this comprises an important research aspect of the risk management sciences phenomenon.

3.2 RESEARCH PROBLEM AND QUESTIONS

3.2.1 Research problem statement – a review

The main research problem investigated in this study is whether a comprehensive set of items representing a valid and reliable scale of ERMVs of managers can be developed and measured empirically in the form of ERM values constructs. In order to address this research problem, a scale of empirically measurable ERMVs items (manifest variables) and the resulting constructs (latent variables) were developed according to the methodology detailed throughout this chapter. The resulting latent variable constructs (latent in the sense that they are not actually observed and stem from the items) are proxied for in the form of items (manifest variables in the sense that these items are actually observed and 'manifest' themselves) represented by ERMVs statements. The items are framed as questions (values statements) with a Likert scale of responses denoting levels of agreement with items, representing the values of respondents that were gathered by an empirical data collection instrument (the survey questionnaire). As outlined in Section 2.3 above, the respondents are asked to rate their own personal values towards ERM key success factors, under consideration of their organisation.

According to Hinkin (1998), an extensive review of the organisational behaviour literature found that inappropriate domain sampling, poor factor structure, low internal consistency and poor reporting of newly-developed measures continue to threaten academic understanding of

organisational phenomena. It is the goal of this dissertation to follow the guidelines set out in the literature to provide a valid and reliable measurement instrument for ERM values.

If the items, scale and constructs are proven valid and reliable proxies for ERM values, these ERMVs constructs can be used as variables in other empirical studies requiring the empirical testing of ERMVs – for example, to test for a statistically-significant relationship between ERM values and a variable such as firm value, as illustrated in the review of several studies in Chapter 2. Furthermore, the ERM values constructs can be tested or cross-validated against other related constructs from the literature, such as NC values, for explaining similarities or differences in observed values – something which is explored in this dissertation.

In order to further test and cross-validate the ERM values constructs developed in this study, those found valid and reliable were tested for statistically-significant relationships with Hofstede and GLOBE NC values constructs, so-called "culture dimensions". As detailed in Chapter 2 and below, the cultural dimensions, as replicated from the literature, are well positioned to act as independent variables to be examined for correlation with the ERM values constructs in order to further test their validity.

It is believed that answers to the study's research questions will significantly develop further ERM theory and practice, realising a potentially beneficial impact on business and management science theory and business management practice.

The research problem statement is therefore:
Can enterprise risk management values of emerging market risk managers be measured empirically in a valid and reliable manner by means of an item-based scale?

If so, does this ERM values scales result in constructs that can be utilised as variables for further empirical research of phenomena related to ERM in the business and management sciences?

3.2.2 Specific research questions

Specific research questions include:

3.2.2.1 Development of the ERM values domain construct

- How can a comprehensive theoretical construct domain of ERM values be clearly defined and demarcated? What is that demarcation of the theoretical ERM values domain construct?
- What pool of items (manifest variables) can be developed to best reflect (and explain) the ERM values domain?
- Do ERM experts confirm the content validity of the item pool, i.e. what is the value of importance they assign to the items, and to what level do they agree on these values?

3.2.2.2 Development and testing of the ERMVS and ERM values constructs

- Within the specified domain construct, can a scale be developed (ERMVS), based on the item set of manifest variables that empirically measures the ERM values construct domain?
- Is this ERMVS valid and reliable?
- Is there systematic variation in ERM values across managers in samples of emerging market risk managers?
- Does this ERMVS generate constructs (latent variables) that empirically measure ERM values of risk managers?
- If so, is there a single or are there multiple (sub-order) constructs that empirically measure ERM values in a reliable and valid manner? What do they represent? What is the explanatory power of the ERM construct(s) model measured by the ERMVS in terms of the defined ERM values construct domain?

3.2.2.3 Cross-validation and testing for a relationship between the ERMVS and cultural values

- Are the national cultural values dimensions (independent variables) derived from the cultural values literature (i.e. Power Distance (PDI) and Uncertainty Avoidance (UAI), found to be valid and reliable in the sample selected for this study of emerging market risk managers?
- If so, is there systematic variation in specific cultural dimensions within the sample?
- Do the observed cultural values dimensions, as well as other demographic variables selected for cross-validation purposes, demonstrate a statistically-significant relationship with ERM values constructs in the selected samples of emerging market risk managers?
- Which cultural dimensions exhibit the most-significant statistical relationship with ERM values constructs? Do the observed systematic construct relationships match those proposed in the theory of ERM and NC values (hypotheses) investigated in this dissertation?

3.3 RESEARCH PHILOSOPHY

3.3.1 Introduction

This section of the chapter discusses the research philosophy and related methodological issues of the dissertation. The objective of the study is to provide conclusions regarding the measurement of ERMVs of emerging market risk managers, culminating in the development of an ERM values measurement scale. As detailed in the introduction and literature review chapters, this topic of ERM measurement is highly relevant for business management in both a South African, emerging market and global context. It is particularly important as the decision-making process organisations implement around ERM has a profound impact on the performance, success, governance and sustainability of the organisations, and correspondingly emerging market economies. Additionally, the relationship between ERMVs and culture values is interesting to

study from both business and management sciences theory and management practice perspectives.

As discussed in detail in Chapter 2, ERM is now firmly entrenched in the boardroom agenda. This is due both to an increase in worldwide corporate governance initiatives,[25] as well as gathering global momentum in terms of the strategic and competitive value ERM provides in the best practices of leading companies.[26] Implementing an ERM framework is clearly instrumental to the long-term governance and sustainability of an organisation (Fraser & Simkins, 2010).

This is especially the case for companies operating in emerging markets, which generally demonstrate higher rates of return corresponding to higher levels of risk, and may offer more limited contractual risk mitigation opportunities (such as insurance) than developed countries (Theil & Ferguson, 2003).

In Chapter 2, the development of risk management as an academic topic of significant theoretical business and management sciences interest was established, as well as the specific importance of empirically measuring risk management, also emphasised by authors such as Kaplan (2011), McShane et al. (2011) and Bromiley et al. (2015). As such, this study, followed a rigorous methodology, which presents the opportunity to provide a knowledge contribution to both academic theory and practice from the business management sciences perspective.

South Africa is a leading emerging market economy as demonstrated by its founding membership of the India, Brazil & South Africa (IBSA) coalition, extended with the acceptance of the invitation to join the world's most influential emerging market grouping of Brazil, Russia, India, China and South Africa (BRICS). Sub-Saharan Africa includes several Next-11 (N-11) emerging markets, and there will be an ever-increasing focus on, and henceforth impetus to study, emerging market economies as their position in the global economy, viewed from the tripartite perspective of resources, manufacturing and consumption, becomes more commanding in the years to come.[27]

An important point to note with regards to the relevance of emerging markets, such as BRICS, to the global economy as stated above, is that the literature review in the previous chapter highlighted the importance of culture in relation to ERM implementation and ERM success. To measure ERM in countries with as much cultural diversity as Brazil, Russia, India, China and South Africa will require an ERM measurement instrument that incorporates cultural sensitivity and values.

As discussed in Chapter 2, the works of prominent researchers on culture and its effects on management values, attitudes and behaviour, such as Fons Trompenaars and Geert Hofstede,

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[25] For example, the Sarbanes-Oxley Act, the Basel Capital Accord and specific to South Africa: The King Codes of Conduct, now in their fourth (IV) iteration. See Young (2006) for an insightful summary.
[26] The case study on Canadian energy company HydroOne is one of the most frequently-cited examples. See Fraser and Simkins (2010:550).
[27] The seminal paper discussing the original BRICS classification is O'Neill, Wilson, Purushothaman and Stupnytska (2005).

have been cited many thousands of times.[28] Large-scale culture studies in the business and management sciences such as GLOBE, which examined cultural and leadership dimensions of 62 countries in detail[29], have established the importance of researching cross-cultural management issues. Specifically, it has been confirmed through this body of work that several attributes or dimensions are associated with and influenced by NC values, such as Future Orientation (FO), Power Distance (PDI) and Uncertainty Avoidance (UAI). These dimensions are strongly linked to, and have demonstrated statistically-significant relationships with management values and behaviours.

It was anticipated that these and other cultural dimensions, if found to be valid and reliable in the study's selected samples, could exhibit a statistically-significant relationship with ERM values constructs in emerging market risk managers – thus acting to cross-validate the ERM values scale and constructs. Upon the establishment of valid and reliable ERM values measures, i.e. scale and constructs, through a deductive methodology (Gill & Johnson 2010), specific cultural values hypotheses as discussed in Chapter 2 were tested for a statistically-significant relationship between individual cultural dimensions (the independent variables) and the ERM values constructs and dimensions (the dependent variables). This methodology formed the basis of the empirical approaches utilised to address the research problem and research questions.

3.3.2 The epistemological approach of the dissertation

With regards to epistemology, and the method of acquiring knowledge within this dissertation, the research perspective of this study was primarily quantitative, and furthermore a critical realist approach was taken in this study. As outlined by Fisher (2010), the underlying philosophical theme in addressing the research problem was a systematic and empirical search for knowledge on the measurement of ERMVs and the numerical quantification of scales and factors to determine reliability and validity, as well as statistical relationships and explanatory power. Furthermore, the study aimed to determine whether there is a correlation between ERMVs and NC values among managers.

The research was undertaken within specified samples, using a numerically-quantified data set, and this philosophy thus represents a perspective of ontological realism. However, while the nature of the predominant philosophy tends towards the positivistic, utilising primarily deductive methodologies, there is also the influence of subjectivity within the research problem (ERM and culture values). This issue was discussed in detail in the previous chapters in terms of the mechanistic vs. organic debate in the business and management sciences literature, as well as the role of the organic (subjective) in ERM implementation, culminating in the aspect of "ERM culture"

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[28] For example, see *Riding the Waves of Culture* (Trompenaars & Hampden-Turner, 2011) and *Culture's Consequences* (Hofstede, 2003). A good review of cross-cultural management literature can be found in Gerhart (2008).

[29] The Global Leadership and Organizational Behavior Effectiveness research programme (GLOBE) 2004.

as explored by Altuntas et al. (2011). Furthermore, as the questionnaire survey respondents were subjects of primary research (emerging market risk managers), the use of some inductive methodologies was also realised. This indicates a gnostic, or personal experience, directional tack to the study (Fisher, 2010).

It is recognised that cause and effect in terms of ERMVs constructs and cultural values dimensions cannot be directly proven within this study. This aspect is certainly not being claimed as knowledge contribution. However, the independent and dependent variables were identified for testing and cross-validation to determine whether they are empirically quantifiable. If they can be analysed for validity and reliability, and are determined to exhibit these characteristics. Furthermore, it can then be determined empirically, whether the constructs exhibit statistically-significant relationships, i.e. are correlated with each other.

3.3.3 Research methods

According to the classic definition of Frey, Botan, Friedman and Kreps (1991:13), “research methods are the particular strategies researchers use to collect the evidence necessary for building and testing theories". As outlined in the previous section, the research perspective of this study is quantitative, and the research type is analytical and correlational as demonstrated by the prominent thrust around ‘classical’ scale and construct development within the research methodology. The aim is to empirically develop and investigate a scale and constructs measuring enterprise risk management and culture values in samples of emerging market risk managers.

To provide a brief summary of the methodology, the development of the scale’s item set, demarcating the conceptual definition of the ERM values domain construct, and its content validity are described in detail below. The primary data for the ERM Values Scale and resulting constructs were sourced via measurement instruments comprised of survey questionnaires, which were developed in a robust methodology as outlined in Section 3.10 below. The research included a pilot/pre-study specific to the ERM values item pool and initial scale and construct development, as well as a main study that was utilised for the collection of data concerning ERM and culture values items and demographic information. The survey questionnaire instruments were utilised to capture the responses to ERM values statements, i.e. questions or items (manifest variables) as well as responses to items or questions from cultural values dimensions replicated from the literature in the specific samples of this study.

With regards to the culture values measurements, these took the form of collection of primary data through specific questions / items comprising dimensions of Hofstede and GLOBE drawn and replicated exactly from previously-published cross-cultural studies in the business and management sciences. Furthermore, the survey instrument captured demographic information about the respondents as proposed in the literature.

It is critically important to recognise that the ERM values scale and constructs were tested for both validity and reliability, as well as for explanatory power by means of exploratory and confirmatory factor analysis. The ERM values constructs or dimensions acted as dependent variables and for cross-validation, were subjected to analysis for statistically-significant relationships with the cultural values dimensions (acting as independent variables).

The samples for the pilot/pre-study and the main study are discussed in Section 3.10. In summary, both samples are comprised of emerging market risk managers – the first group from the telecommunications industry, and the second group from members of the Institute of Risk Managers of South Africa (IRMSA).

3.3.4 Quantitative criteria

3.3.4.1 Reliability

With relation to scientific, empirical measurement of constructs, such as management values within the business and management sciences domain, Alasuutari, Bickman and Brannen (2008) clearly stated that the usual requirements are that the measures developed (and the findings generated thereby) must demonstrate reliability and validity respectively.

Reliability refers to the extent that the same measurement technique or instrument produces the same result on different occasions, potentially with different researchers and within different studies. This is particularly relevant to this study, as most importantly, the values (or attitude) scale of the ERM values measures and variables being developed must give consistent results. The same holds true for any other independent variables utilised for cross-validation of constructs, such as culture values dimensions, being introduced and included in the tests. If a measure is not reliable, it is argued that the related findings can also not be valid, i.e. the measurements produced are not consistent to begin with. Then to make conclusions around the meaning of findings, i.e. that what it is that has been measured, is not possible, hence limited validity. In summary, with regards to reliability and validity, as proposed by Alasuutari et al. (2008:44), for this dissertation we "define 'reliability' of measurement techniques as the capacity to produce consistently valid measurements", leading to findings and conclusions that can be held as true.

3.3.4.2 Validity

Following on the discussion of reliability, Alasuutari et al. (2008) pointed out that the concept of validity goes beyond determining meaning of findings, and considers whether variables have been controlled sufficiently to allow conclusions around causal or predictive hypotheses. This aspect could be dubbed "internal" or "causal" validity and represents a consideration very relevant to this study. The ERM values items are considered to be "formative" indicators, as opposed to "reflective" ones as per Diamantopoulos and Siguaw (2006) – see Figure 3.3 in the exploratory factor analysis (EFA) Section 3.7 below. This means that the items influence the constructs they comprise from a bottom-up perspective, instead of being influenced the other way around. Furthermore, in terms of

cross-validation, the ERM values constructs are hypothesised to demonstrate statistically-significant relationships, i.e. correlations, with culture values dimensions. This is further discussed in Section 3.9 below.

3.3.4.3 Generalisability

The third key criterion of quantitative assessment, according to Alasuutari et al. (2008), is generalisability of the findings external to the sample of the specific research. This could be termed "external validity", and is a particularly relevant issue in this study in terms of the instrument drawing data from survey research. The data were drawn from certain samples – emerging market telecommunications and IRMSA risk managers – so the question is posed: Do the statements and findings made within these samples also hold true to a greater population, and if so, to what degree? As a specific example, the ERMVS would eventually be expected to be used as a measurement instrument for a variety of managers in an organisation, not just risk managers. Limitations regarding generalisability of the findings are discussed in the results presented in Chapter 4.

3.3.4.4 Biases

The issue of biases also plays a role related to the design of the study methodology. Biases impact several aspects of the study, including measurement, generalisability and potential claims of knowledge, in that the study relies on the accounts of informants within the sample (values statements). It must be recognised that there could be distinctive potential biases within these informants' accounts. Dealing with potential bias in the study is discussed in further detail in the section on development of the survey instruments (Section 3.10) below as well as in the results section of Chapter 4 to follow.

3.3.4.5 Claiming of knowledge

According to Alasuutari et al. (2008), there are three types of knowledge that can be claimed in a scientific study, namely descriptive, explanatory and theoretical; each of these presents its own parameters and limitations around validity. In terms of this taxonomy, this study is mainly exploratory, in terms of developing and testing a new ERM values measurement instrument. Regarding the contribution to knowledge, the study purports to make predominantly descriptive knowledge claims. For example, as related to the phenomena of ERM values in a quantitative sense, whether the phenomena being described actually exhibit the features ascribed to them, and whether the features are possessed to the degree indicated. Additionally, some explanatory and theoretical knowledge is claimed in the study, which is closely linked to the literature and theory reviewed and utilised in developing the methodology of the study.

In terms of the investigation claiming knowledge based on statistically-significant relationships determined between the ERM values constructs, and the cultural values dimensions, the reliability and validity of all the subordinate descriptors, such as the culture values dimensions, also need to

be established. Furthermore, according to MacKenzie et al. (2011), to claim knowledge, the validity of the theoretical principles and explanatory forces must be cited. Further exploration of *causal* relationships between the ERM values variables and other variables, such as, between ERM values and culture values, is not claimed as knowledge as a part of this study, but is clearly indicated as a future research direction.

3.3.4.6 Summary

To summarise, the issues of reliability, validity, generalisability, biases and the claiming of knowledge are raised above. These issues are discussed and further addressed in more detail as most appropriate in the relevant sections of the dissertation. They also feature in discussions throughout the methodology and findings sections where appropriate. As recommended by Alasuutari et al. (2008), the methodology of the dissertation indicates critical thought and evidence application of judgement within this study towards these critical primary quantitative evaluation criteria; the requisite methodologies provided by the literature on the 'classical' scale and construct development are followed and documented within the dissertation.

3.4 DEFINING AND MEASURING ERM VALUES

3.4.1 Introduction to the development of the ERM scale and constructs

The measurement of ERM values is at the core of this dissertation. Within disciplines in the business and management sciences, such as marketing and human resources, the development of measures for management phenomena, such as behaviours, attitudes or values towards management practices, is closely linked to the science of psychology. This field of empirical research has a history dating back almost a century, to the beginning of the 20th century. According to Morgado, Meireles, Neves, Amaral and Ferreira (2017:16), so-called "modern psychometry", termed Item Response Theory (IRT), follows on directly from Classical Test Theory (CTT). CTT is used as a general framework for the development, administration and interpretation of assessment tools, the so-called "Old Rules of Measurement" for applied psychologists and psychometrists. It has its roots in much earlier work even than the seminal work of Gulliksen (1950), dubbed the "defining volume for CTT", according to the literature reviewed by Alasuutari et al. (2008:271).

In the 1920s, Charles Spearman, after whom the test to determine the amount of error in test scores and identification of common factors (Common Factor Theory) is named, pioneered the procedures still used to this day (Spearman, 1927). Guttman (1945) introduced the concept of internal consistency by showing how items within a test could also be used to determine reliability. Cronbach (1951) continued with this concept and the most common measure of internal consistency reliability is in turn named after him – Cronbach's coefficient alpha (C **α**). These tests represent some of the 'classical' empirical research methods that were used in this study in the development and testing of ERM values scales and constructs.

In the business and management sciences, MacKenzie et al. (2011) provided a recent comprehensive review of construct measurement and validation procedures for the Management Information Systems (MIS) domain. The review referred to research completed in organisational psychology, marketing, IT etc. and is applicable across the spectrum of business and management sciences. In summary, MacKenzie et al. (2011) concluded that not too much had changed in terms of construct development since the influential works published by renowned scholars, such as Edwards and Bagozzi (2000), Straub (1989) and the most-often cited seminal article by Churchill (1979) [30].

Churchill (1979) was the first to attempt to empirically measure and examine management phenomena in the form of multi-layered quantitative marketing constructs such as customer satisfaction. His study provided a resilient blueprint for business and management sciences construct development. Churchill's (1979) clear model for developing a measurement construct for a business and management sciences phenomenon is represented in Figure 3.1. This model formed the basis for the development of the ERMVs measurement instrument of this study.

30 Cited more than 15 000 times according to Google Scholar (30.05.2017)

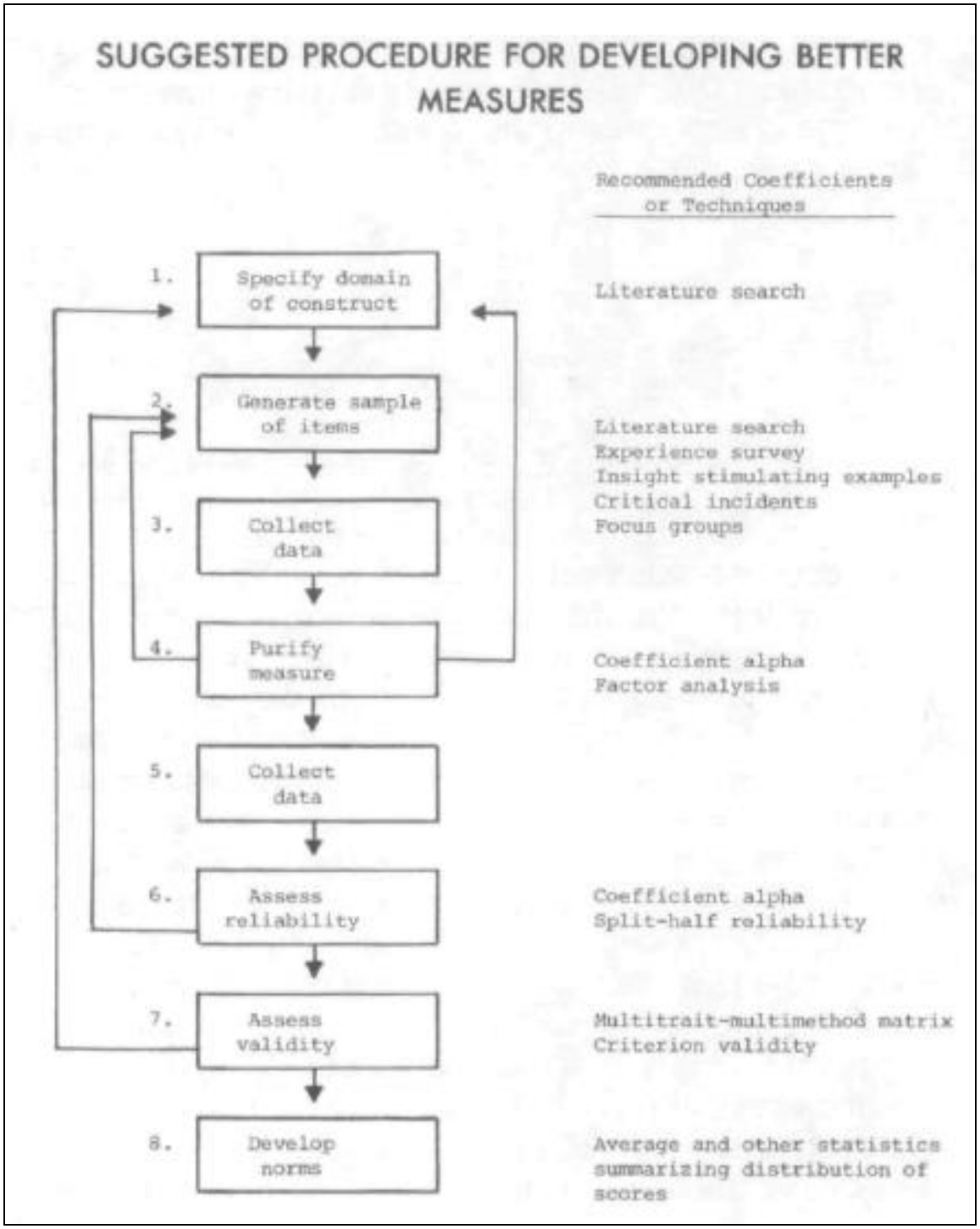

Figure 3.1: Suggested procedure for developing better measures

Source: Churchill, 1979.

There are many similar models in the literature, but this study focused on an additional model further developed and updated from Churchill's (1979) by MacKenzie et al. (2011), who based their model on the seminal review of the management sciences construct development literature. This model provides further details as related to scale and construct refinement as outlined in Figure 3.2 below.

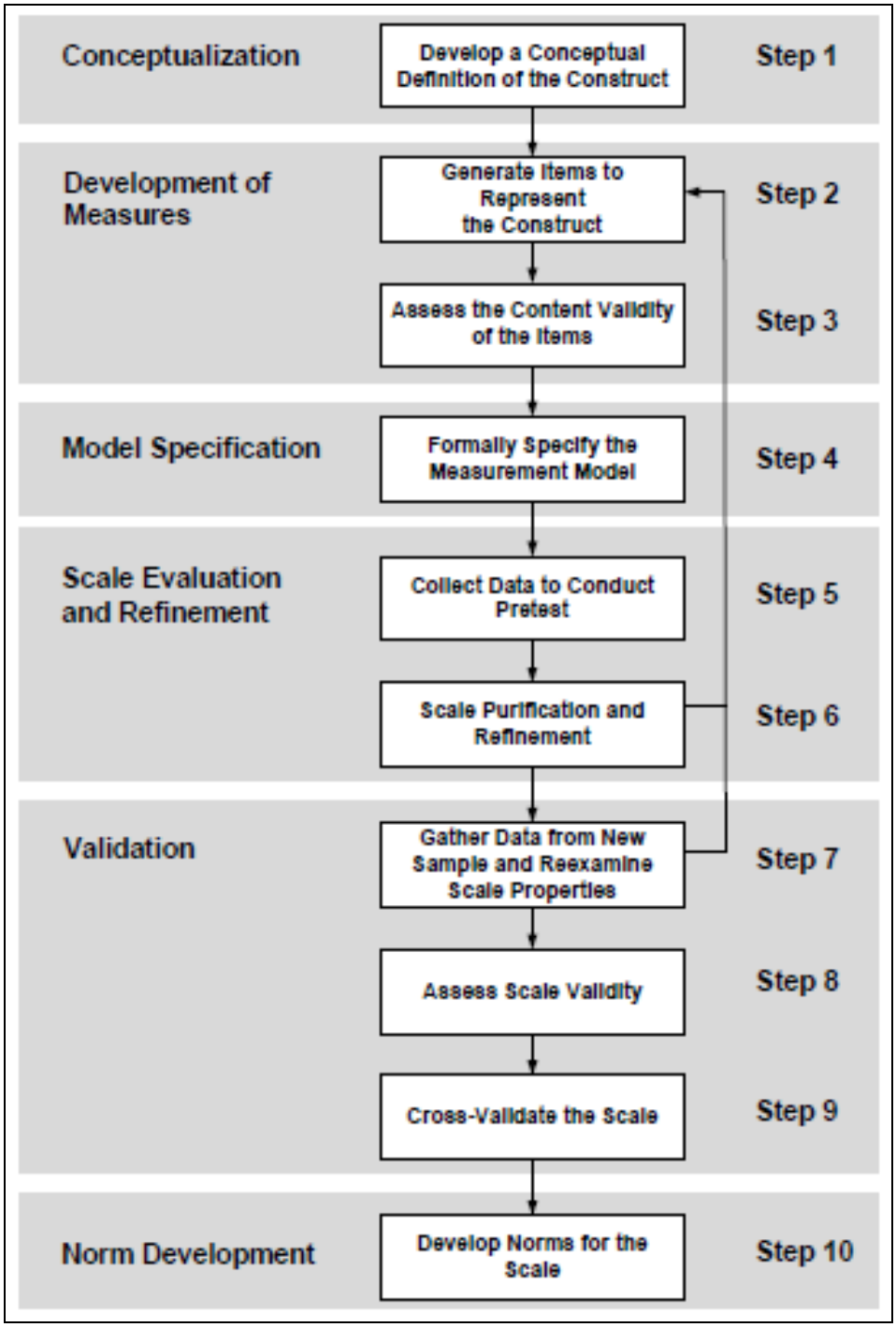

Figure 3.2: Overview of scale development procedures

Source: MacKenzie et al., 2011.

As alluded to by various authors in the articles reviewed for this dissertation, construct development is a strenuous empirical exercise demanding significant resources and time. Hinkin (1998:118) stated that "scale development clearly involves a bit of art as well as science. Anyone who has gone through a process similar to that described above will understand the difficulty of developing sound measures". The scope of this dissertation continues through Step 9 of the model by MacKenzie et al. (2011), with norm development identified as a future research direction.

The models presented above represent the main theoretical elements related to the processes followed in the research methodology of this dissertation with respect to the development and empirical testing of an ERM values scale and constructs.

3.4.2 The definition of what is to be measured: ERM values

In following the procedure for development of measures (scales and constructs) proposed by Churchill (1979), as outlined above, the first step is to specify the theoretical domain of the construct. In other words, it is vital to clearly demarcate the boundaries of the management phenomenon being investigated and proposed to be measured. Churchill (1979:67) indicated that, in developing a construct measure and specifying the domain of construct, the researcher must begin by being "exacting in delineating what is included in the definition and what is excluded". The influential articles in this field agree that clearly defining the conceptual domain of the construct is one of the most critical steps in the methodological process. According to MacKenzie et al. (2011), one of the primary sources of failure in construct development research, is not adequately defining the construct domain. This is because as it is the first step, so much of the research output is contingent on this aspect. As outlined in the literature review, not conducting this first step of scale and construct development, i.e. delineating and making explicit the theoretical construct domain, is one of the shortcomings of previous ERM measurement studies, such as Gates et al. (2012), which this study aimed to address.

The research problem of this dissertation concerns the measurement of ERM values, and in the case of this study, the scale and construct or constructs that were developed should act as measurement instruments for ERMVs developed from a clearly-defined ERM values domain construct. As per Churchill (1979), the way to specify the domain of the construct is to perform a comprehensive literature review, which for this study was conducted and reported on in Chapter 2. Chapter 2 provided a comprehensive review of the enterprise risk management practitioner and academic literature and delivered a clear demarcation of the theoretical domain construct for an ERM values scale, namely within nine pillars as bounded by an adaptation of the framework of the ISO 31000 (2009) practitioner standard for ERM.

In order to measure ERM values, a concrete definition of the term 'ERM values' was established. The broader definition of ERM values, as could be exhibited by one or more ERM values constructs resulting from an Enterprise Risk Management Values Scale (ERMVS), is comprised of individual ERM value statements (items or manifest variables) representing, *within the defined ERM values construct domain* (author's emphasis), the broad canon of ERM practice and academic theoretical components or elements thereof.

Resulting from the literature review, the breadth of the various elements of ERM practice and theory is represented in the item pool. The item pool and its distillation is presented and discussed within step two of the research methodology, following the empirical methodology of the scale and construct development models introduced from the literature, e.g. Churchill (1979) and MacKenzie et al. (2011). The process is discussed in further detail in the following Section 3.5. It is important to reiterate that the frame of the ERM values landscape, and thus the demarcation of the theoretical construct domain for this study, was provided by the nine pillars of ERM extracted from the literature and adapted from ISO 31000 (2009). These formed the mileposts of categorising the initial item pool namely:

i. Mandate & Commitment (M&C);
ii. Framework Design (FD);
iii. Establish Context (EC);
iv. Risk Assessment (RA);
v. Risk Treatment (RT);
vi. Risk Monitoring & Review (RM&R);
vii. Framework Monitoring & Review (FM&R);
viii. Communication & Consultation (C&C); and
ix. Continual Improvement (CI).

With reference to MacKenzie et al. (2011:298), it is important not to assume that "labelling or naming the construct is equivalent to defining it" and that "researchers need to formally specify the nature of the construct." In terms of the 'nature' of the ERMVs construct, according to MacKenzie et al. (2011), there are several factors to consider.

The first consideration is the 'property' of what is being measured. In the case of the ERMVS, the property is ERM success factors. A further consideration regarding the property is specification of what exactly is being measured – thoughts, feelings, perceptions, actions or outcomes. The literature review determined it was critical to assess how individual managers feel about the ERM phenomenon, and so a values construct, a subset of the feelings classification, was specified.

The second consideration is the 'entity' that the construct applies to – in the case of this study, managers are the entity being investigated. Managers are the object to which the property applies. MacKenzie et al. (2011) noted in their literature review, that many scale development studies were plagued by poor definitions of the domain construct as well as the entity and property specifications, a message this study has strongly considered.

3.5 ERM VALUES ITEM POOL DEVELOPED FROM THE LITERATURE

3.5.1 Overview

The second step in scale and construct development, as per Churchill (1979), is to generate a sample of items that could potentially act as measures of the construct covering the breadth of the defined theoretical construct domain. These take the shape of statements (manifest variables). MacKenzie et al. (2011:304) summarised the point quite clearly: “once the focal construct has been theoretically and conceptually defined, the next step in the process is to generate a set of items that *fully* (author’s emphasis) represents the conceptual domain of the construct”.

Hinkin (1998) discussed a deductive approach to item generation and scale development, whereby the theoretical foundation provides enough information to generate the initial set of items. The deductive approach requires a strong understanding of the phenomenon under investigation and a thorough review of the literature to theoretically define the construct under investigation. This study employed a deductive approach to item generation for the ERM values scale.

This pool of items generated for the scale in this study emanated as an output from the literature review, whereby in Chapter 2, the full canon of practitioner, governance and academic literature relating to ERM was reviewed in depth. From each relevant source, statements representing components of the ERM framework, and thus potentially critical or key success factor items, were extracted. In this first step of item development, 224 ERM key success factor statements (manifest variables) were captured, from more than 20 sources, representing the full item pool.

Further details on the item review and selection process are provided in Chapter 4 presenting the results. The full item pool developed from the literature review is presented in Appendix A. For the purposes of explication in this chapter, two examples from the full item pool are illustrated in Table 3.1 below. Each item was captured in the form of a statement, its source was noted (Full details of sources are provided in Appendix A), and which of the nine ERM pillars it was most strongly associated with was attributed in the column “Dimension”. In the case of item 1 in Table 3.1, the Dimension or pillar of the item is “EC”, i.e. Establish Context.

Table 3.1: ERM key success factor items

Item no.	Final items mean	Included content validity	Source	Dimension	Item alias	Statement
1	3.50	X	Altuntas	EC	Risk Culture	The organisation develops a risk management culture that influences employees and stakeholders to consider risk information in their decisions
2	3.44	X	IRM	C&C	Escala-tion	The organisation has a clearly-defined chain of accountability and escalation for risk management issues

Source: Author's compilation subset of Appendix A.

3.5.2 Finalisation of initial item pool

As indicated in the previous section, the initial item pool stemming from the literature review comprised 224 items. The next step in the scale refinement process, according to MacKenzie et al. (2011), is to ensure the wording of each item is as simple and precise as possible, and furthermore, that there are no ambiguous or unfamiliar terms. It is also imperative to check for duplication and syntax issues. With reference to the ultimate goal of the item generation process, MacKenzie et al. (2011: 304) stated it is to "produce a set of items that fully captures all of the essential aspects of the domain of the focal construct, while minimizing the extent to which the items tap concepts outside of the domain of the focal construct."

Additional guidelines on item selection and development limitations, such as wording and scorings were proposed by Morgado et al. (2017) and Hinkin (1998). The final distilled ERMVs domain construct item pool submitted to the expert group panel as below included 101 items. The item pool development process is discussed in further detail in the results and findings of Chapter 4.

3.5.3 Content validity of item pool: Expert group review

MacKenzie et al. (2011) referred to Kerlinger's (1973:459) seminal text, *Foundations of Behavioral Research,* in defining content validity. It is stated as "the degree to which items in an instrument reflect the content universe to which the instrument will be generalized". Investigating content validity is the next key step in construct development – dubbed "Theoretical Analysis" by Morgado et al. (2017:9).

Though there are many approaches to assess content validity reviewed by MacKenzie et al. (2011:306), it was concluded that using expert raters' judgement is very common and successful. However, it is stated that when selecting people to serve as raters, "it is important to also ensure that they have sufficient intellectual ability to rate the correspondence between items and the theoretical definitions". There was debate in the literature (MacKenzie et al., 2011) about raters being representative of the main population of interest vs. their domain construct expertise. In this

case, as suggested by MacKenzie et al. (2011) for technical domain constructs, ERM experts were purposefully selected as raters due to the need to understand the topic conceptually and the specific and unique subject matter and theoretical knowledge required around ERM.

Adapting an approach first proposed by Yao (2008), and recommended by MacKenzie et al. (2011), ERM key success factor items were arranged within different aspects of the theoretical construct domain. In the case of this study, they were organised as demarcated by the ISO 31000 (2009) inspired nine pillars of ERM. The experts were then requested to rate the importance of each item in relation to the construct domain using a 4-point Likert scale. As indicated by MacKenzie et al. (2011), raters can reliably distinguish between 8-10 aspects of a content domain at a time, so the nine ERM pillars appeared to be an appropriate demarcation.

Furthermore, experts were asked whether they could suggest any additional items within each of the nine pillars, as well as whether any additional pillars could be proposed to measure the broader ERM values construct. Selected feedback from the experts is presented in Appendix B.

The outputs of the expert group's content validity testing are discussed in more detail in Chapter 4 in the corresponding results section. In summary, 23 items (manifest variables) were selected to be included in the first ERM Values Scale. As is discussed in further detail in Section 3.10 below, for the pre-study and main study to follow, the ERM key success factor items were framed as values statements, requesting respondents to rate the importance to them of each item on a scale. As established in Chapter 2, in order to gain an understanding of an organisation's risk culture, and more specifically how the risk culture affects practices such as ERM, it is important to measure and understand managers' individual values towards ERM key success factors.

MacKenzie et al. (2011) indicated that there are two important judgements to be made when assessing items for content validity. Firstly, whether the individual item is representative of an aspect of the content domain of the construct; and secondly, whether the items as a set collectively represent the entire content domain of the construct. Fabrigar, Wegener, MacCallum and Strahan (1999:273) warned that, if "a researcher inadequately samples measured variables from the domain of interest, he or she may fail to uncover important common factors" in subsequent factor analysis providing content validity testing, such as EFA. The recommendation is to carefully define the domain of interest, an imperative that was discussed throughout Section 3.5 and represented in the culmination of the item selection. Testing of the content domain construct aspects is discussed in the next steps as per the factor analysis methodology outlined in Section 3.7 below.

3.6 RELIABILITY OF ERM VALUES SCALE AND CONSTRUCTS

As outlined in the literature reviewed above, it is critical to conduct tests to establish the reliability of both ERM values items and constructs, as well as the culture values dimensions / constructs used for cross-validation. According to the review by MacKenzie et al. (2011) of the construct development literature, the accepted standard for determining reliability of indicators at the

construct level is Cronbach's alpha. This test is appropriate, because the type of measurement model set out for Cronbach's alpha implies internal consistency among the items comprising the measures. According to the literature (e.g. Morgado et al., 2017), the target reliability is often a Cronbach's alpha measure of 0.70 or greater, though with a larger number of measures, alpha could be expected to be higher. Technical issues around these reliability tests as they relate to the study are discussed in the appropriate sections of the results chapter.

The second measure of reliability and validity of each sub-dimension and its indicators (manifest variables) is to assess the proportion of variance in the construct accounted for by the sub-dimension(s) and the items comprising it. Average variances, according to MacKenzie et al. (2011) are expected to exceed 0.50, i.e. sub-constructs (latent variables) and their item sets (manifest variables) are to explain more than 50 percent of the variance. The testing as related to this study is discussed in more detail in the corresponding section in the discussion of the results in Chapter 4.

3.7 EXPLORATORY FACTOR ANALYSIS (EFA) OF ERM VALUES CONSTRUCTS

According to Fabrigar et al. (1999:272), "Since its initial development nearly a century ago (Spearman, 1904, 1927), exploratory factor analysis (EFA) has been one of the most widely-used statistical procedures in psychological research". Costello and Osborne (2005:2) stated:

> *The aim of (exploratory) factor analysis is to reveal any latent variables that cause the manifest variables to covary. During factor extraction, the shared variance of a variable is partitioned from its unique variance and error variance to reveal the underlying factor structure; only shared variance appears in the solution.*

There are numerous factor analysis extraction methods to choose from – in fact Costello and Osborne (2005:2) referred to them as "completely confusing". The various statistical software packages feature a variety of extraction methods (Statacorp, 2015). For this study, the Stata software was utilised, the details of the techniques utilised in this study are provided in the corresponding results sections of Chapter 4.

The ERM values constructs proposed in this study are second-order latent constructs with first-order sub-dimensions as formative indicators. Figure 3.3 below shows the difference between reflective and formative causal model structures.

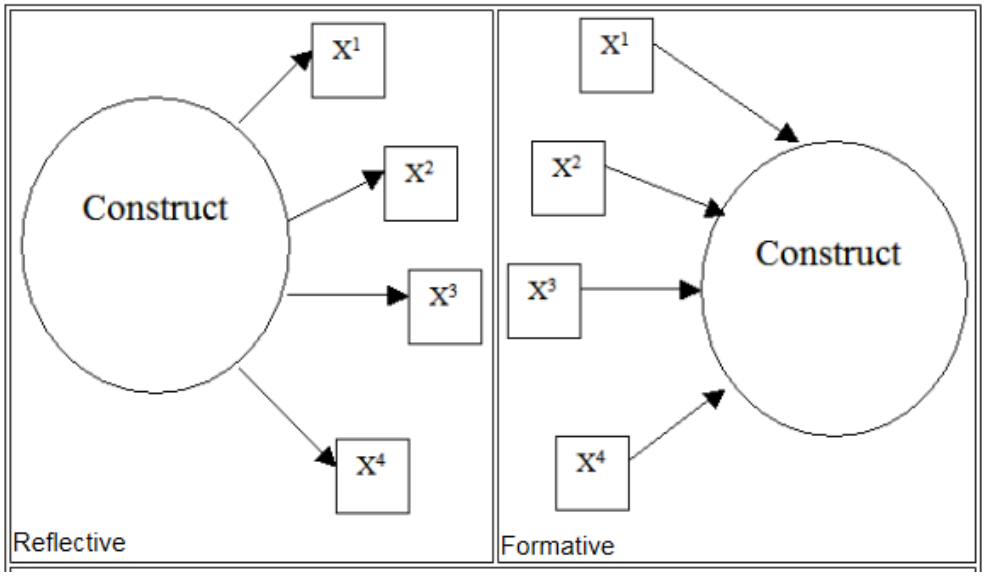

Figure 3.3: Causal structures

Source: Diamantopoulos and Siguaw, 2006.

In summary, a formative construct, as an ERM values construct is, is influenced, or formed, by the manifest variables (items). It is hypothesised that within the ERM values item pool, there are sub-constructs, in probability linked to the ERM pillars. The theoretical ERM values construct model could thus look similar to Panel D in Figure 3.4 below.

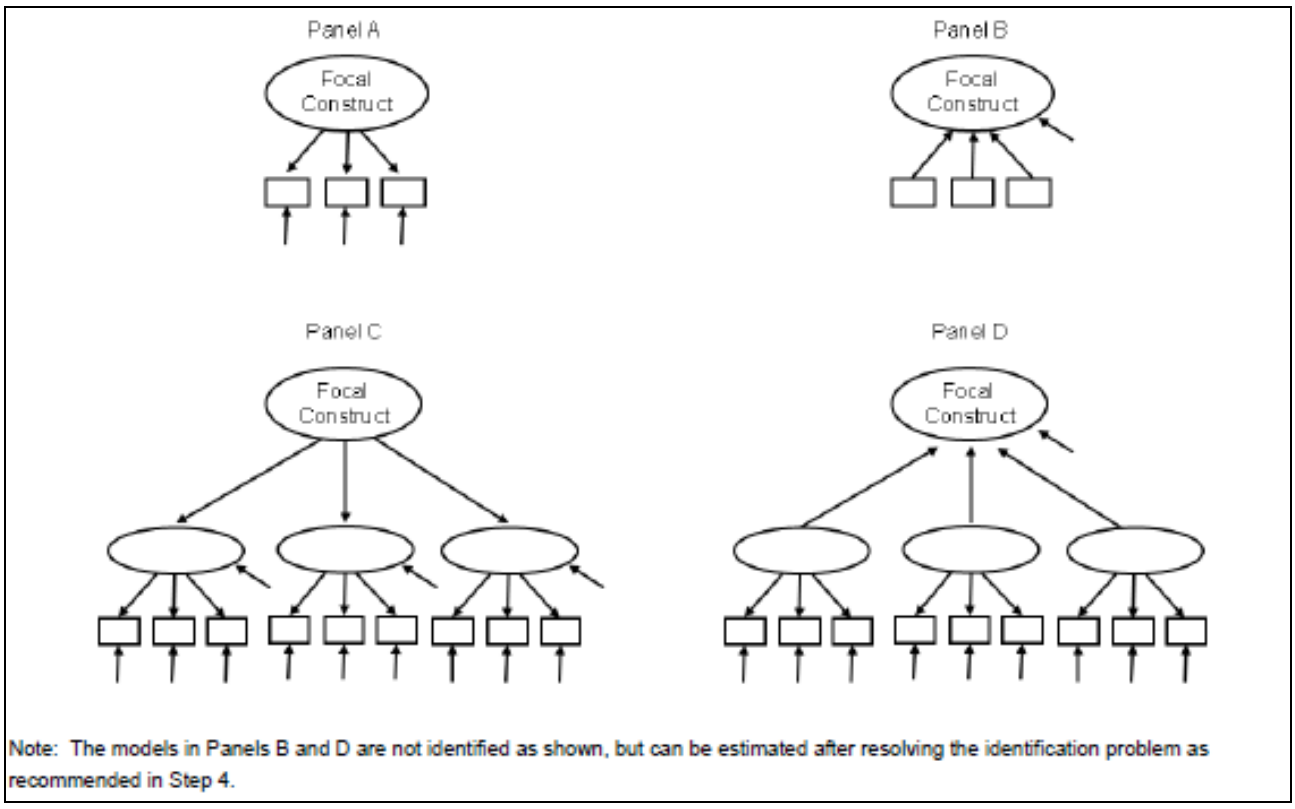

Figure 3.4: Examples of First-Order and Second-Order measurement models

Source: MacKenzie et al., 2011.

The reason for conducting EFA as part of the scale and construct development process in this study was thus to determine whether there is a focal ERM values construct, and furthermore, whether there are sub-constructs comprising ERM values. In this study, following the 'classical' method of scale and construct development, EFA was conducted on the ERM values items in the pilot/pre-study.

A variety of EFA methods, for example factor extraction, model rotations and interpretation of loadings, were applied in this study. The technical aspects and outcomes as related to this study are discussed in the results in Chapter 4. Confirmatory factor analysis (CFA) expounded on in the next section (3.8), is a further test of the robustness of the constructs and provided evidence as to the extent of the reliability and validity of these constructs.

3.8 CONFIRMATORY FACTOR ANALYSIS OF ERM VALUES CONSTRUCTS

Confirmatory factor analysis (CFA), in its most basic definition uses a theoretically-defined model that dictates the interaction of variables and constructs, such as was illustrated in Figure 3.3 and Figure 3.4 above. Once established, this model is then tested to determine the fit with the sample data. With reference to CFA, Hinkin (1998) stated that, if the previous steps in scale and construct development have been carefully followed, it is highly likely that the new scales will be internally consistent and possess content validity. Whilst they are good at providing a preliminary view on the construct structure, one of the weaknesses of typical factor (construct) analytical techniques, such as EFA, is their inability to quantify the goodness of fit (GoF) of the resulting construct structure (Hinkin, 1998). GoF is quite literally what its name implies, a measure (or group of measures) indicating how well the proposed CFA measurement model under testing fits the sample data. According to MacKenzie et al. (2011), "it is best to rely on multiple goodness of fit measures from different families of fit indices." Items (manifest variables) that load clearly on an EFA may demonstrate a lack of fit in a multiple-indicator measurement model due to lack of external consistency. "CFA requires a researcher to specify a specific number of factors as well as to specify the pattern of zero and non-zero loadings of the measured variables on the common factors" (Fabrigar et al. (1999:277). Because CFA incorporates focused testing of specific hypotheses about the data, it is "often useful to use EFA and CFA in conjunction with one another" (Fabrigar et al., 1999:277).

Computer programs (such as Stata used in this dissertation) provide techniques allowing for the researcher to assess the quality of the factor structure by statistically testing the significance of the overall model and of item loadings on factors. According to Hinkin (1998), "In scale development, confirmatory factor analysis should be just that – a confirmation that the prior analyses have been conducted thoroughly and appropriately". As per Bagozzi and Edwards (1998), each item comprising the scale needs to be statistically assessed for inter-correlation and loading on potential factors (constructs). Making use of two samples is critical in terms of generalisability and required

for CFA. In the case of this study, it was investigated whether the factor structure determined by EFA in the telecoms industry risk manager sample (pre-study) can be confirmed in the IRMSA sample (main study). In other words, CFA was conducted in this study to compare the factor structure provided by the EFA outputs in the pre-study, by means of investigating "goodness of fit" (Hinkin, 1998) with the results from the main study. The study also further investigated generalisability of the construct structures via variables such as age, education, profession, position in the organisation or ethnicity, as per Bagozzi and Edwards (1998:59).

The technical details of the tests utilised and the results for this study are discussed in the relevant sections of the results presented in Chapter 4.

3.9 CROSS-VALIDATION OF THE ERM VALUES CONSTRUCTS

3.9.1 Introduction

As indicated in earlier sections of this methodology chapter, in the process of developing a measurement scale and resulting constructs, an independent variable is required to test and cross-validate the dependent variables – in the case of this study the ERMVs constructs. According to MacKenzie et al. (2011), it is important to consider the interlocking system of laws which constitute theory – these are referred to as the "nomological network". One of the best ways of testing the nomological network is to determine how indicators of the focal construct relate to measures of other similar constructs and what the lawful relationships between the focal construct and related established constructs are. Hinkin (1998) proposed to administer the new scale (in the case of this study the ERMVS) along with similar established measures to examine the nomological network, i.e. the relationship between existing measures from the literature and the newly-developed scales.

In their seminal work, Bagozzi and Edwards (1998:129) in fact insisted that "one must consider the relationship of the concept under investigation to other concepts in an overall context of a theoretical structure". MacKenzie et al. (2011) elaborated on this point by outlining that the other constructs to be investigated in the context of the focal construct could be antecedents, correlates or consequences of the identified construct. According to Hinkin (1998), in order to test the external construct validity, the researcher can utilise *convergent validity* tests (assessing correlation with similar measures) or *criterion-related validity,* namely variables hypothesised to correlate with the constructs or variables being developed. As proposed by Morgado et al. (2017), incorporating other objective or independent measures supplements the subjective evaluation of variables (i.e. bias) that is possible in self-reporting quantitative studies, and furthermore improves interpretation of the findings.

In the case of this study, as was discussed throughout Chapter 2, and specifically in Section 2.8,, the culture values instruments of Hofstede (2003) and GLOBE (Javidan, Dorfman, De Luque & House, 2006) are ideally aligned to test convergent and criterion-related validity. Hofstede (2003) and GLOBE (Javidan et al., 2006) promulgated similar items and measurement criteria to those of

the ERM values scale and construct development. Most specifically, they requested respondents to rate values on a Likert scale. Furthermore, there is a clear nomological (theoretical) link between the proposed ERMVS and the culture dimensions selected for cross-validation, as provided by the hypotheses (exhibited in Appendix I) presented for each culture dimension's possible relationship with ERM values constructs, for example, the culture dimension of Uncertainty Avoidance (UAI) being associated with rules-based ERM values. These Hofstede (2003) and GLOBE (Javidan et al., 2006) culture dimensions therefore presented themselves as ideal candidates for cross-validation, i.e. correlation testing with the ERM values constructs.

Within this study, culture values dimensions were thus defined by NC scales both at an aggregated level of analysis, and also broken down into sub-groups for cross-validation with the ERMVs constructs. GLOBE (Javidan et al., 2006) was the first of the major culture dimensions research projects to define sub-groups, for example, the South African sample is split into 'Black' and 'White'. Investigating culture values at sub-group level is an important, recent research direction in the study of culture. This study aims to contribute to this area of research, by having split the sub-groups further and reporting on the findings of validating the culture values dimensions in the selected samples.

Building from this starting point of analysis, culture was broken down into various cultural constructs or dimensions derived from the literature and hypothesised to exhibit a relationship with ERM values constructs. Examples of culture dimensions tested in this study are Power Distance (PDI), Uncertainty Avoidance (UAI) and Future Orientation (FO). Individual responses were aggregated to a group level by means of indices to reach a score for each cultural construct. Replicating the Hofstede (2003) and GLOBE (Javidan et al., 2006) instruments directly from the literature, each individual survey questionnaire respondent addressed a number of questions related to the various cultural dimensions, demographics and ERM actual and desired behaviour. This enabled a number of levels of analysis, such as organisational and functional.

The hypotheses developed around the effect of each of the 11 culture dimensions from GLOBE (Javidan et al., 2006) and Hofstede (2003) selected for the study were discussed previously in Chapter 2, and are exhibited in Appendix I. The analysis featured simple regression tests to determine whether there were statistically-significant relationships between the constructs/ variables (correlation). The findings are presented in Chapter 4.

3.9.2 Hofstede dimensions replication

As outlined in Chapter 2, with regards to NC values, Hofstede, Hofstede and Minkov (2010:18) elaborated on the link between culture and nationality as a grouping:

> *Within nations that have existed for some time there are strong forces toward further integration: (usually) one dominant national language, common mass media, a national education system, a national army, a national political system, national representation in sports events with a strong symbolic and emotional appeal, a national market for*

> *certain skills, products and services. Today's nations do not attain the degree of internal homogeneity of the isolated, usually non-literate societies studied by field anthropologists, but they are the source of a considerable amount of common mental programming of their citizens.*

The Hofstede Values Survey Module (VSM-13) has been found to be an acceptable measure for NC values in numerous replications in a management sciences context, including Mearns and Yule (2009:783) who had utilised VSM-94 and indicated that "the measure was sensitive enough to differentiate between the national groups on all cultural dimensions".

The study utilised the VSM-13 and the following Hofstede (2003) culture dimensions were replicated in the main study:

- Power Distance (H-PDI);
- Uncertainty Avoidance (H-UAI);
- Individualism (IDV);
- Masculinity (MAS);
- Long-term Orientation (LTO); and
- Indulgence vs. Restraint (IVR).

Each of the dimensions was tested for reliability and validity within each of the sub-group samples. Those dimensions found to be reliable and valid for a group were utilised for cross-validation (correlation analysis) with the ERM values constructs.

3.9.3 GLOBE dimensions replication

As discussed in the previous chapter, the GLOBE (Javidan et al., 2006) study is an extension of Hofstede's (2003) efforts in NC dimension research. GLOBE (Javidan et al., 2006) provided additional culture dimensions that were hypothesis-tested in this study and utilised for cross-validation of the ERM values constructs.

The following GLOBE culture dimensions were replicated in the main study, utilising the GLOBE methodology and survey instrument (Javidan et al., 2006):

- Power Distance (G-PDI);
- Uncertainty Avoidance (G-UAI);
- Performance Orientation (PO);
- Future Orientation (FO); and
- Collectivism (COL).

Each of the dimensions was tested for reliability and validity within each of the sub-group samples. Those dimensions found to be reliable and valid for a group were utilised for cross-validation (correlation analysis) with the ERM values constructs.

3.10 THE PRE-STUDY (PILOT) AND THE MAIN STUDY

3.10.1 Introduction

The primary empirical data collection components or artefacts of this research are comprised of two online survey questionnaire instruments, the pilot/pre-study and the main study, responded to by emerging market risk managers as outlined in previous sections. As indicated by Hinkin (1998), in scale development it is necessary to use independent samples. The sample of the pilot study is comprised of emerging market telecommunications industry risk managers, and the second, main study, of members of the Institute of Risk Management of South Africa (IRMSA), i.e. emerging market risk managers. The sample and methodology of executing the instruments are discussed in further detail below.

The literature had indicated that for studies incorporating a cross-cultural element like this one, a sample as homogeneous as possible should be selected (GLOBE, 2004). Therefore, the emerging market risk managers being studied hailed from specifically the telecommunications industry and IRMSA. The second sample presented a broader base upon initial validation of scale and constructs, to import greater statistical power for the various empirical tests being conducted. As proposed within the literature (e.g. Morgado et al., 2017), the pre-study and main study processes and their requisite samples were also consciously promulgated as intermediate steps with regards to providing expert knowledge in developing the ERM values scale and constructs. The respondents were very familiar with the conceptual and theoretical elements of enterprise risk management values. The samples are elaborated on in further detail in Chapter 4 (results), where the demographic data and results are presented.

Questions around ERM values in the survey questionnaire instruments took the form of values statement items (manifest variables) designed to develop factors, clusters or dimensions (latent variables) that would act as dependent variables for further research purposes around the business and management sciences domain of ERM. Similar to the culture values dimensions being empirically tested, these were evaluated on a scale to give an empirical, quantifiable result for statistical analysis. All the questions (items) were based on interval scales allowing the respondent to express a range of responses to the questions.

According to Sjöberg (2002), quantitative rating scales are the preferred method for surveying values statements such as risk perception. Sjöberg (2002) further concluded that category or Kline scales with a limited number of response categories, such as 5 to 7, appear to be preferable, giving respondents the opportunity to express a suitable array of responses on scales. Hinkin (1998) referred to studies that had demonstrated that coefficient alpha reliability with Likert scales was shown to increase up to the use of five points, but then levels off. Selecting this type of scale for this study enabled statistically-significant differences or variations in scores, that could be attributed to ERM or culture values, to become apparent in the survey data analysis.

Data were collected by means of the Stellenbosch University SUrveys application, which is an online software product provided by Checkbox (Version 4.7). Examples of the actual survey questionnaire instruments utilised are provided in Appendices C, D and E.

According to MacKenzie et al. (2011), once the items and the measurement model have been finalised, data need to be collected in order to test the psychometric properties of the scale and to evaluate technical issues, such as convergent, discriminant and nomological validity. For this purpose, a pilot study was first conducted on the ERM Values Scale items.

3.10.2 The pilot/pre-study

According to MacKenzie et al. (2011), it is very important that the pre-test sample represents the population for which the measures are designed. For the pilot study, the sample was comprised of managers familiar with enterprise risk management in telecommunications companies deploying an ERM framework. Unfortunately, the number of respondents was smaller than desired, with 34 valid responses in total from 65 invitations sent out to respondents. MacKenzie et al. (2011) purported that the literature recommends sample sizes of minimum 100 respondents as a “rule of thumb” to conduct exploratory factor analysis (EFA). However, in an article dedicated to a review of and recommendations regarding sample sizes in factor analysis, MacCallum, Widaman, Zhang and Hong (1999) concluded that smaller sample sizes can be acceptable when communalities are high and factors strongly determined. Hinkin (1998) referred to samples sizes of only 20, suggesting that small samples may be appropriate for analysis, where factor loadings are high. According to MacCallum et al. (1999) small sample size validity has been positively tested in many studies by a process of using sub-samples within a larger sample and checking the results from various slices of sub-samples. For the main study, the sample size was certainly large enough to pass any guidelines from the literature on both the overall recommended respondent number, i.e. 200 for CFA (Hinkin, 1998), as well as the guideline of respondents per item, i.e. more than ten (>10) (MacKenzie et al., 2011).

3.10.3 The main study

The main survey questionnaire instrument captured data on the ERM values scale, the Hofstede and GLOBE culture values scales as well as demographics of the sample respondents. For the purposes of the main study, permission was granted by IRMSA to gain access to the database of IRMSA associates (risk management practitioners as discussed in the previous chapter). The response rate was positive and over 300 valid responses were collected, providing an acceptable basis for CFA testing. This sample was very appropriate for the reasons previously presented, i.e. that respondents are experts in ERM and have knowledge of the ERM content and construct domain, further contributing to validity of the scales and constructs. The demographics of the sample are summarised and discussed in the related results sections of Chapter 4, where the full results are presented and discussed.

3.11 CONCLUSION

In summary, it was established that it is of great interest to the global business management community, from both a practitioner and academic perspective, to understand the ERM values of (risk) managers in emerging markets. Organisations exist to create value and ERM is central to value creation. In order to understand an organisation's risk culture, and specifically how this culture relates to ERM practices, it is critical to be able to measure and understand the values of individual managers towards ERM key success factors. Currently, no theory, nor measurement scale, nor constructs of ERMVs exist, which can be used to predict or explain differences in ERM behaviour or practice due to values of managers. It is the aim of this research to take a significant step towards filling this gap in knowledge.

Following the 'classical' scale and construct development process as detailed in the literature, this chapter provided a full description of the research methodology implemented to address the research problem and questions – namely the development of an ERM values scale and resulting constructs to empirically measure ERM values. Recent comprehensive reviews of the construct development literature in the business and management sciences have demonstrated that much of the 'classical' process remains similar to the methodology detailed in Churchill's (1979) seminal work in marketing management. However, there have certainly been advancements in terms of study design improvements, identifying limitations, elaborating and reporting on each of the steps of the process. This is particularly relevant to technical issues around factor analysis and cross-validation of constructs.

This study has attempted to follow a "best practice" process compiled and adapted from the literature in terms of designing the stages of scale and construct development and testing, as well as providing comprehensive reporting on each of the steps. In the next chapter, the specific tests conducted are elaborated on and the corresponding results from the two studies and samples are presented and discussed.

CHAPTER 4
ANALYSIS OF RESEARCH DATA: RESULTS, FINDINGS AND INTERPRETATION

Most measurements in the behavioural sciences involve measurement error, but judgements made by humans are especially plagued by the problem (Shrout & Fleiss, 1979:420).

4.1 INTRODUCTION

This chapter provides the detailed analysis of the research data and comments on the results, the findings and their interpretation. As discussed in the previous chapters and highlighted specifically in the methodology sections of the study, this dissertation is concerned with the empirical measurement of ERMVs. As has been delineated in the chapters leading up to this one, and expounded on further below, the study followed a 'classical' business and management sciences methodological process to develop an empirical measurement scale and resulting constructs for ERM values. This process represented a journey through the requisite empirical testing landscape, focusing on the 'classical' analyses of measure reliability and validity (content, construct and criterion). As alluded to by Shrout and Fleiss (1979) in the quote opening the chapter, the empirical research of this dissertation was made more complex (and interesting) by the human factor. The study developed an ERMVs measurement scale comprised of constructs, which incorporated a human and organic element as exhibited earlier, for example, in the discussion of Contingency Theory in the literature review.

Figure 4.1 below provides a view on the landscape of the theoretical composition of this study about the development of the ERMVS and resulting constructs. There are several contributions of this dissertation – the most important of which is the development of a valid and reliable quantitative measure of enterprise risk management values (the ERMVS), which is theoretically derived and applicable for managers of organisations. This chapter documents the process that was followed to develop and empirically determine the validity and reliability of the ERMVS.

The first step in the ERMVS development process is represented by the blue oval in Figure 4.1 below – namely the clear definition of the theoretical domain construct. This critical opening step was conducted as part of the literature review process on ERM, as discussed in detail in Chapter 2. The resulting output of the first step of the new ERMVS development was an initial pool of 224 items representing potential measures of ERM (manifest variables) to be utilised in the scale development process. The primary item set was in turn reduced to 102 items as presented in the methodology in Chapter 3. Further detail on this process is set out in Section 4.2 below

where the item generation and further refinement process is discussed in greater depth. The next step in the scale development process was the further optimisation of the item pool based on content validity testing completed by a group of experts. This step is reflected in the box titled "Expert Group" in Figure 4.1 below. It resulted in the distillation to 23 ERM items (manifest variables) comprising the first empirical ERMVS for testing. The expert group process is discussed in further detail in Section 4.3 below.

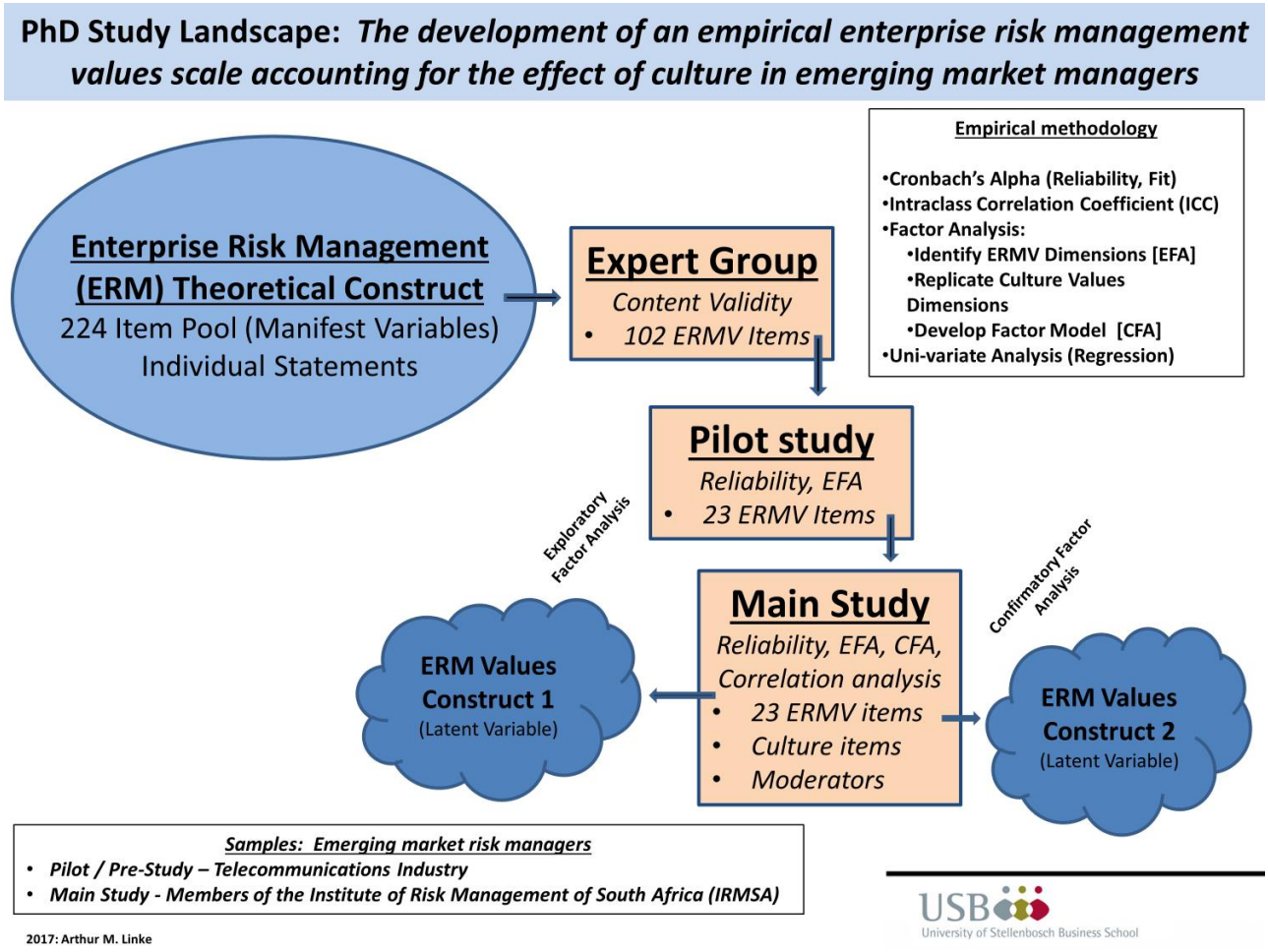

Figure 4.1: The PhD study landscape: The development of the ERM values scale and constructs

The step that followed on from the expert group review in the scale refinement process was to frame the ERM items as values statements, and test the first ERMVS in a pilot study using a sample of emerging market risk managers in the telecommunications industry. This step is represented by the second box titled "Pilot Study" in Figure 4.1 above. This part of the process empirically tested the reliability of the scale and through exploratory factor analysis investigated for underlying constructs as part of further validity testing. These tests and the results are discussed in detail in Section 4.4 below.

The final significant and multi-faceted step in the process is addressed in the box in Figure 4.1 above titled “Main Study”. This part of the scale and construct development process utilised a second, larger sample to further empirically refine the scale and underlying constructs. This sample was comprised of risk managers in emerging markets belonging to IRMSA. Confirmatory factor analysis was conducted on this sample data, with the two resulting ERM values constructs depicted by blue clouds in Figure 4.1. In addition, correlation analysis was undertaken to cross-validate the ERM values constructs with culture values dimensions and selected moderators incorporating the demographics of the respondents.

The final set of tests for cross-validation is elaborated on in Figure 4.2 below which details the two ERM values constructs or dimensions (blue clouds), the nine culture dimensions and moderators utilised, as well as the sub-groups of the sample within which certain of the tests were conducted.

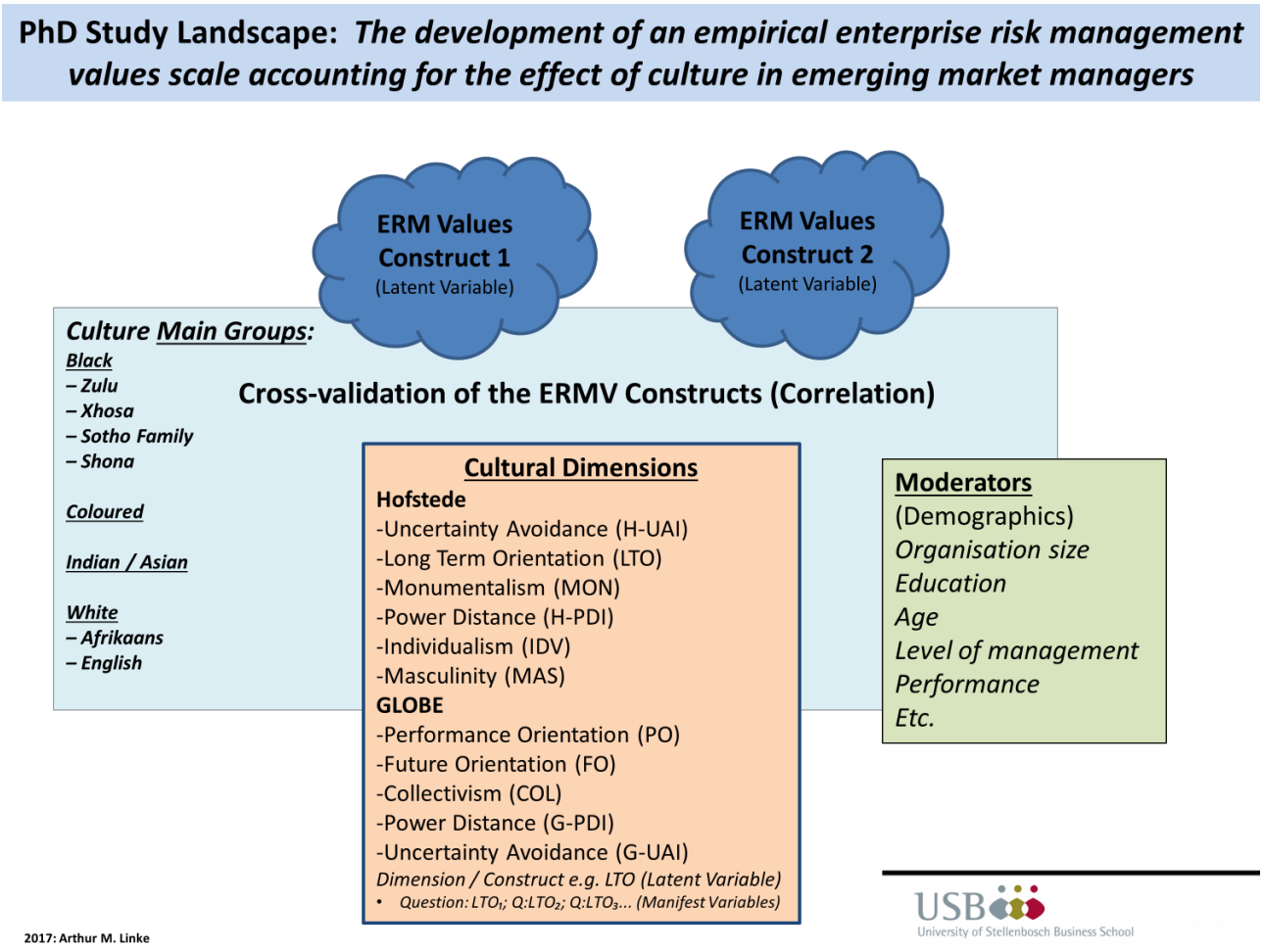

Figure 4.2: The PhD study landscape: Variables utilised for cross-validation

The format and layout of Chapter 4 is generally set out as per the step-wise order of the steps of scale and construct development outlined in Figures 4.1 and 4.2, beginning with the generation of the original ERM item pool which was based on the demarcation of the theoretical domain construct emanating from the literature review.

4.2 THE THEORETICAL DOMAIN CONSTRUCT AND ORIGINAL ERM VALUES ITEM POOL

Chapter 2 provided a comprehensive review of the enterprise risk management academic and practitioner literature, and delivered a clear demarcation of the theoretical domain construct for an ERM values scale. This demarcation was within nine pillars as bounded by an adaptation of the framework of the ISO 31000 (2009) practitioner standard for ERM. It is important to reiterate that the frame of the ERM values landscape, and thus the demarcation of the theoretical construct domain for this study, whilst provided by these nine pillars of ERM extracted from the literature and adapted from ISO 31000 (2009), included the full spectrum of ERM practitioner, governance and academic literature.

To recap, the pillars forming the mileposts of categorising the initial item pool are:

- Mandate and Commitment (M&C);
- Framework Design (FD);
- Establish Context (EC);
- Risk Assessment (RA);
- Risk Treatment (RT);
- Risk Monitoring and Review (RM&R);
- Framework Monitoring and Review (FM&R);
- Communication and Consultation (C&C); and
- Continual Improvement (CI).

From each relevant source, statements representing components of the ERM framework (i.e. potential “success factors” or “critical aspects”) were extracted. These all represented potential ERM values measurement items. In this first step of item development, 224 ERM values statements (potential manifest variables) were mined, from more than 20 sources, representing the full initial item pool.

The full set of items generated in this process can be found in Appendix A. For the purposes of explication, the final item pool selected emanating from the expert group review (comprising 23 items) and utilised in the pre-study ERMVS is depicted in Table 4.1 below. In the full table, each of the total 224 items is numbered in the far-left column. If the item was one of the 102 selected for expert group content validity (discussed in Section 4.3 below), it is marked with an “X” denoting inclusion in the third column. The numerical figure in second column refers to the mean score of the 23 items selected as per the expert group content validity testing (also discussed in detail in Section 4.3 below). The “Source” column refers to the source of the item in the literature, whereby a key is provided to the relevant authors at the end of Appendix A.

Each item from the literature was captured in the form of a statement (Column 7 in Table 4.1 below), and which of the nine ERM pillars it was most strongly associated with was attributed in the column “Dimension” (Column 5) in Table 4.1 below. In the case of item 1 in Table 4.1, the Dimension or pillar of the item is “EC” – Establish Context. Aliases (Column 6 in Table 4.1) were assigned to each item in the form of short names to assist in providing a unique, succinct summary to be utilised in the empirical testing (i.e. labelling of variables for statistical testing).

As referred to in Section 3.5, items were developed utilising a deductive methodology discussed by Hinkin (1998). This methodology requires an understanding of the phenomenon to be investigated, building on the thorough review of the literature which contributed to the theoretical definition of the construct under investigation. Based on this understanding, the comprehensive item pool of 224 potential manifest variables was systematically reduced to 102 items, by removing duplications, items with ambiguous wording etc. These 102 items, which are clearly demarcated in the full item list provided in Appendix A, were presented to the expert group for content validity testing as detailed in the following section.

Table 4.1: Description of the 23 ERM items

Item no.	Final items mean	Included content validity	Source	ERM dimension	Item alias	Statement
1	3.50	X	Altuntas	EC	Risk Culture	The organisation develops a risk management culture that influences employees and stakeholders to consider risk information in their decisions
2	3.44	X	IRM	C&C	Escalation	The organisation has a clearly-defined chain of accountability and escalation for risk management issues
3	3.44	X	Arena	RA	Comprehensiveness	The organisation takes into consideration a comprehensive range of risks from all relevant categories, such as financial, operational and reputational
4	3.44	X	Gates - RR1	RA	Regular basis	Formal risk identification and assessment is conducted throughout the organisation on a regular basis
5	3.39	X	ISO	FD	Policy	The organisation's risk management policy clearly states objectives for, and commitment to, risk management
6	3.39	X	ISO	FD	Embedded	Risk management is embedded in the organisation's practices and processes in a way that is relevant, effective and efficient
7	3.39	X	Woods	FD	Tailored	The risk management framework is tailored to the type of organisation, its industry or sector, its architecture (i.e. functional areas and operating units) and processes
8	3.39	X	S&P	M&C	Governance	The organisation's governance structure reflects the influence of risk and risk management on decision-making across the organisation
9	3.39	X	Woods	RM&R	Action Plans	Action plans relating to risks and their treatment are distributed and assigned to individual owners in the organisation and systematically followed up on
10	3.33	X	IRM	C&C	Relationships	The risk management function of the organisation builds and sustains relationships across all areas of the organisation, including executive leadership
11	3.33	X	Altuntas	M&C	RM Authority	The organisation's risk management department / function exerts real authority derived from executive leadership
12	3.33	X	Gates - IE 1	M&C	Management communication	The organisation's leadership conveys the value proposition and benefits of risk management to employees
13	3.28	X	IRM	CI	Employees improving	In the organisation, all employees take responsibility for improving risk management

14	3.28	X	S&P	CI	Learnings	The organisation learns from experience and adjusts its risk management practices to improve its ability to measure and manage risk
15	3.28	X	Arena	EC	Understand roles	The organisation's risk management framework spans across the organisation, and employees have a clear understanding of their roles and responsibilities with regards to risk management
16	3.28	X	ISO	EC	Understand External	The organisation has an understanding of its external context, including the legal, regulatory, economic and competitive environment and the key drivers and trends impacting objectives and how they relate to risk management
17	3.28	X	Shenkir	FD	Framework Holistic	The risk management framework is holistic, taking a systemic view to integrate risk management within the organisation, countering the effects of silos (even possible silos of risk excellence such as the IT or insurance functions) in functions or operating units
18	3.28	X	Aon	M&C	Exec sponsor	The organisation has a visible risk management "sponsor" or "champion" in senior management
19	3.28	X	IRM	M&C	Direction	The organisation's leadership sets clear expectations and strategic direction for risk management
20	3.28	X	ISO	M&C	Exec endorsement	Senior management clearly defines and endorses the organisation's risk management policy
21	3.22	X	IRM	C&C	Quality	Quality risk information is demanded as part of the decision-making process within the organisation
22	3.22	X	Arena	FD	Integration	The organisation integrates ERM with other existing practices and processes such as strategic planning, budgeting and auditing
23	3.22	X	Gates - RR5	RT	BU Mitigation	The organisation develops and determines risk mitigation strategies within the business or operating unit level, closest to the risks

4.3 EXPERT GROUP: CONTENT VALIDITY

4.3.1 Introduction

As has been presented as a focal issue of the dissertation and was discussed in detail in Chapter 2, there is no empirical primary data measure for ERM values in the academic literature. The development of such a measure, by means of empirical scale and construct development, was the focus of this study.

Chapter 3 discussed the methodology of the 'classical' scale and construct development process followed in this dissertation, and stressed the importance of *content validity* (Refer Churchill, 1979). For these reasons, namely the specific lack of a defined domain construct for ERM, coupled with the importance of content validity testing in scale and construct development, it was of *particular* importance to this study to conduct rigorous content validity on all aspects of development of the proposed ERMVS. For this purpose, as recommended by Hardesty and Bearden (2004) in their seminal work on the use of expert judges in scale development, a panel of ERM expert judges was convened to review the main item pool emanating out of the literature review and ERM domain construct definition phase.

The use of expert judges for content validity testing and inputs in scale development is well documented in the literature, with Hardesty and Bearden (2004) providing a review of articles addressing the use of experts in content and face validity testing. They discussed the concerns over consistency and guidance regarding the expert judging phase of scale development. Beyond content validity, expert judges also assist in determining face validity, which is also critical to the successful development of scales. According to Hardesty and Bearden (2004), the terms face and content validity have often been used interchangeably even though there is an important conceptual difference. Hardesty and Bearden (2004) continued by presenting a dartboard analogy, which is also very applicable to this dissertation. If the domain construct of ERM being measured in this study is represented by a dartboard, then the darts, representing the items (manifest variables) must land all over the board in order to provide a proper representation of the construct. Darts hitting the board have face value, and ideally, there would be darts represented all over the board to ensure content validity, i.e. not just specific clusters limiting the interpretation of the construct. In summary, an expert group review assists in ensuring items demonstrate face and content validity required to operationalise the construct, "after all, sound scales are necessary for any scientific discipline to move forward" (Hardesty & Bearden, 2004:99).

4.3.2 Details of the expert group

The expert group selected for this study was comprised of a sample of ERM experts, from academia and industry as illustrated in Table 4.2 below. While many of the experts are South African, some hailed from a variety of countries such as the UK, the Netherlands and the USA. As discussed above, the sample of experts was expected to provide significant input into content and

face validity of the ERMVS, from both an academic and practitioner perspective, and thus the sample of experts was not selected randomly. It is recognised that a purposive sample approach as selected for the study does run the risk of bias in the sample (and thus potentially influence the results and conclusion with regards to various aspects of validity). A random sample of experts was, however, not practical for this study, and would not necessarily have provided better content validity. The ideals of optimal sampling are rarely met in reality in terms of selecting an expert group, in this example as relates to ERM experts. To provide the most diverse sample of judges, a comprehensive spectrum of ERM experts was selected purposefully and recruited for participation in the study. The pool of experts was comprised of academic faculty, private and public sector senior risk managers, persons from global professional risk management associations and members of the consulting sector specialised in ERM.

Table 4.2: Members of the expert group

Expert group panel for content validity of ERM items		
No.	**Function**	**Industry**
1	Senior Manager (Risk)	Telecommunications
2	Professor (Risk Management)	Academic – Finance
3	Director	GRC Software
4	Director	Re-Insurance
5	Professor (Risk Management)	Academic / Public Policy
6	Director	Professional Risk Association
7	Director (Risk Management)	Telecommunications
8	Director (Risk)	Municipality
9	Principle	Risk Consulting
10	Director (Risk)	Academic Institution
11	Senior Manager (Risk)	State-owned Enterprise
12	Associate	Risk Consulting
13	Senior Manager (Risk)	Telecommunications
14	Senior Manager (Risk)	Insurance
15	Senior Manager (Risk)	Telecommunications
16	Director (Risk Management)	Telecommunications
17	Senior Manager (Risk)	Telecommunications
18	Principle	Risk Consulting

Hardesty and Bearden (2004) reviewed previous studies utilising expert judges and found that the number of judges varied greatly. Many of the 39 studies reviewed had only a handful of judges such as three, four or five, whereas some had up to 52 judges. The average number was ten. For the purposes of this study, 18 judges were included and deemed to be a reasonable sample.

The item pools of the studies reviewed by Hardesty and Bearden (2004) contained ten to 180 items, on average 65 items were in the pool. The final scales selected ranged from two to 82 with the average being 12. As has been discussed, this study began with an item pool of 224 items, which was reduced to 102 for the expert group review.

The descriptive statistics of the expert group survey results are depicted in Table 4.3 below.

Table 4.3: Summary of expert group survey results

Descriptive statistics of the Expert Group survey	
Valid Sample (N) - Raters (k)	18
Valid Sample (N) – Items / Targets (j)	102
Mean Item Score	2.96
Min. Item Score	2.41
Max. Item Score	3.50
Standard deviation (SD)	0.26
Cut-off score for items (23x) inclusion in ERMVS (Mean + 1 Standard Deviation):	3.22

The final ERM values scale emanating from the expert group judging comprised 23 items. The methodology and selection criteria are discussed in further detail in Sections 4.3.3 and 4.4.4.

In their review of the use of expert groups, Hardesty and Bearden (2004) found that scale developers use a variety of rules for determining which items to retain. In the case of this study, the methodology applied was to have experts rate each of the 102 items, within the pillars of the study, on a scale of 1 to 4 in terms of their importance. In order to test the reliability of the rating process, as proposed by Shrout and Fleiss (1979), the Intra-class Correlation Coefficient (ICC) was calculated for the scores and raters. The ICC is discussed in the following Section 4.3.3.

Comments and feedback provided by the expert panel, both in terms of the ERM item content as well as the survey process, were informative to the study, and are summarised in Appendix B. The full expert group survey questionnaire instrument is provided in Appendix C.

4.3.3 Intra-class Correlation Coefficient (ICC)

Stata (2015) pointed out that data are often measured with error that can seriously affect statistical interpretation of the results, and therefore it is important to assess the amount of measurement error by evaluating the consistency or reliability of measurements. Or as Shrout and Fleiss (1979:427) put it bluntly: “It is important to assess the reliability of judgements made by observers in order to know the extent that measurements are measuring anything”. This is of particular importance when examining outputs such as those of an expert group investigation into issues like content and face validity as discussed by Hardesty and Bearden (2004).

Stata (2015) noted that the intra-class correlation coefficient (ICC) is often used to measure the consistency or homogeneity of measurements, specifically measurements of a single class (intra-class) where there may be a second variable providing those measures. This is the case in the expert group content validity testing whereby a fixed pool of raters/judges were scoring a single class of measures (ERM items). Several versions of ICCs were introduced in the literature over the past decades, depending on the experimental design and goals of the study. The seminal works on ICC include those by Shrout and Fleiss (1979) and McGraw and Wong (1996).

Figure 4.3 below illustrates the flow chart for selecting an appropriate ICC. In the case of this study and the expert group content validity testing, there is a two-way model as judges (as a column variable) were rating items. The judges/raters denoted by the variable name “k” throughout the data analysis are fixed, meaning that every rater must rate every item, and the raters are the specific persons of interest (they do not come from a greater sample, or are randomised). The ERM items (targets or measurements of interest and row items) are denoted by the variable j and are considered a random effect meaning that they as targets are from a broader sample and the various permutations of scores by the raters on them are tested for correlations.

In the case of this study, it is of interest to determine the extent of the agreement of the ratings as per McGraw and Wong (1996), but absolute agreement on the items (i.e. the exact rating score) was not anticipated as raters (human beings) demonstrate bias in applying the response range and anchor points in scoring of items. It was consistency by judges’ scores across items that was being tested for and assisted in selecting the ERM items with the greatest content validity for the ERMVS. Following the flow chart, ICC measure ICC (C,1) was selected for this study, the tests for which can be run in the Stata statistical software package.

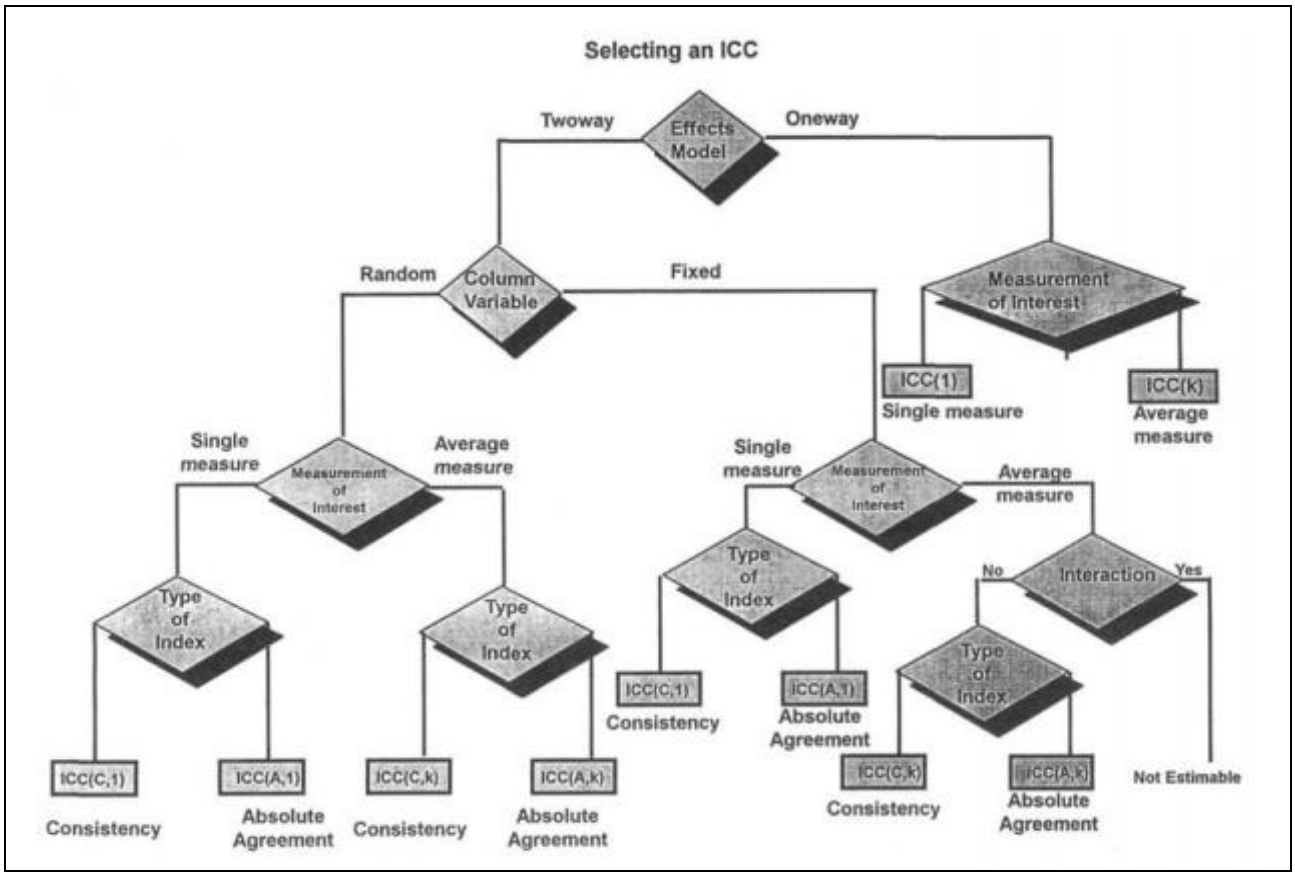

Figure 4.3: Flow chart for selecting an appropriate ICC

Source: McGraw and Wong, 1996.

According to Stata (2015), in a two-way mixed-effects ICC model, the targets selected for the test are randomly selected from the total population of potential targets, and each is evaluated by the same (fixed) set of k raters. This is different to a a mixed-effects model, however, where the assumption is that the raters are the only raters of interest. So, similar to the other ICC models, the targets are random, but in this case, the raters are fixed. In the two-way mixed-effects model, the fixed effect of the rater's scoring, does not contribute to the between-rater random variance component to the total variance. This therefore leads to the definitions and interpretations of ICCs being different in a mixed-effects model than in a random-effects model. Nevertheless, the estimates of ICCs as well as test statistics and confidence intervals are the same. In a two-way mixed-effects model, the CA-ICC corresponds to the correlation between measurements by the selected raters on the same target. As pointed out by Shrout and Fleiss (1979), when the rater variance is ignored, the correlation coefficient is interpreted in terms of rater consistency, which is the expectation for this study, rather than rater absolute agreement. Formally, the CA-ICC is the ratio of the covariance between measurements on the target to the total variance of the measurement.

The ICC test estimates correlations between individual measurements and between average measurements made on the same target (item). In interpreting the results of Table 4.4 below, the

individual correlation result (ICC) at 0.09 was positive, but relatively small. This effectively means that there was some, but not large consistency in scores of all the raters on each individual item. However, when the average scores were tested, the ICC score of 0.65 was positive and large. The average ICC score has been compared to conducting a Cronbach's Alpha reliability test on the total scale by authors such as Shrout and Fleiss (1979). These results indicated confidence intervals for both individual and average ICC scores which are reasonable and in line with the ICC scores reported, i.e. not too wide-ranging.

Table 4.4: Results of the ICC tests for the expert group rating data

Intra-class correlations (ICC): Two-way mixed-effects model			
Random effects: "j"		Number of targets = 102	
Fixed effects: "k"		Number of raters = 18	
Item	**ICC**	**95% confidence interval**	
Individual	0.0919839	0.0606428	0.1356178
Average	0.6458216	0.5374736	0.7385020
F test that			
ICC=0.00: F(101.0, 1717.0) = 2.82 Prob > F = 0.000			

Referring back to Table 4.3 and the standard deviation (SD) value of 0.26 on the scores for the 102 items rated by the judges, this is a relatively small value for the scale range and represents an important point to note. As Weir (2005:236) indicated in an article discussing ICC and standard error of the mean (SEOM), there is "certainly no consensus as to what constitutes a good ICC". The challenge described by Weir (2005) is that all other things being equal, low levels of between-subject variability will serve to depress the ICC score. In other words, more homogeneous scores, such as those identified by the small SD in this ICC test of the expert group, will naturally lead to a lower score on the ICC. Conversely, heterogenous scores i.e. those with wide ranges and a high SD will provide a higher ICC. Weir (2005) also noted that the SEOM is very much influence by the SD of the judges' scores, in fact the formula for the SEOM = SD$\sqrt{1-ICC}$. This significance of the SD should be noted for the discussion of the methodology of item reduction from the expert group ratings for the ERMVS in Section 4.3.4.

Finally, an F test was conducted with the null hypothesis that ICC = 0. In other words, that there is no agreement between raters in terms of the importance of the items. The F value was 2.82 with degrees of freedom as 101 and 1 717 based on the sample size, and a p of < 0.001. So, the null hypothesis could be rejected, as there was in fact a statistically-significant agreement between raters.

The ICC findings overall indicate, that there was a statistically significant (albeit relatively small) agreement on the importance of the ERM key success factor items which is positive for the scale development process. The statistically significant but relatively low ICC score also suggests that

the variety of perspectives of the sample of experts is high, and thus unlikely to be biased in any particular direction. In other words, the ICC score on the one hand could be reflective of reduced bias and possibly high content validity (Refer the dartboard analogy in Section 4.3.1). In any case, the expert group rating of the ERM items should be an ongoing process as the scale develops over time - ERM is still an evolving discipline and there will continue to be contributions to the understanding of ERM key success factors.

4.3.4 Conclusions of the expert group study: final item set for the ERMVS

An expert group was convened to test the content validity of the 102 items and to reduce the item pool for the ERMVS. In order to test agreement between the judges on their ratings of items across the scale (consistency), the study also investigated the intra-class correlation coefficient (ICC) of the expert judges' ratings. After the ratings were found to show statistically-significant consistency, it was determined to reduce the item pool, by considering for the ERMVS those items scoring one SD above the mean, i.e. a score greater than 3.22 on the 4-point scale.

In total, this meant that 23 items as exhibited in Table 4.1 and Appendix A (explained above) were selected for inclusion in the ERMVS. This represented a significant reduction from the 102 items that went into the expert group review. This criterion of a cut-off of one standard deviation above the mean was selected as a more qualitative than quantitative criteria. Including 102 items in the ERMVS would be prohibitive for its implementation, and one of the goals of the expert group review besides content validity testing was in fact, to cull the number of items.

The significance of SD in empirical studies of measurement scales is documented in the literature. Beyond the relationship between SD and measures like the SEOM and ICC score as discussed by Weir (2005) highlighted above, Datta, Guthrie and Wright (2005), in a study on strategic human resource management, investigated the effect of high-performance work systems (HPWS) with among other variables, labour productivity. HPWS were measured with a self-reporting primary data scale. In determining the effect of HPWS scales, Datta et al. (2005:142) investigated the significance of the "impact of a one-standard deviation increase in the use of the high-performance work systems scale on labour productivity". When industry growth was high, they found that those respondents scoring greater than one standard deviation above the mean on the HPWS scale demonstrated sales per employee increased significantly – in fact, they increased 20.1 percent over the mean sales. Datta et al.'s (2005) study is an example that demonstrates the significant impact that high scores, i.e. those one SD above the mean, can have on outputs linked to measurement scales. For the ERMVS development it was important that those items were included in the scale that the expert group scored as most important.

Selecting a one-standard deviation above the mean cut-off for the ERMVS also ensured that at least one item from each of the original pillars demarcating the ERM domain construct was selected for inclusion in the ERMVS. In conclusion, the ICC tests indicated that there was statistical evidence of some agreement at individual level on the importance (both high and low) of

the ERM items. The average scores ICC result indicated a strong level of positive correlation between the items, and the results of the F test also lead to the conclusion that there was a level of agreement and consistency among the raters towards the item set. The items that were scored the highest by the expert group, and thus found to be the most important were selected to be included in the ERMVS. These were specifically those items scoring greater than one standard deviation from the mean. The 23 items that comprise the ERMVS were then incorporated into the pilot/pre-study for further testing of reliability and validity. The results of the pre-study are discussed in the following section.

4.4 THE (PILOT) PRE-STUDY

4.4.1 Sample and descriptive statistics

The sample for the pre-study of the ERMVS was comprised of 36 risk managers in the telecommunications industry in emerging markets. These risk managers were sampled purposefully based on their experience with ERM in emerging markets. They came from three MNCs in the telecommunications industry based throughout Africa. Not all the responses were complete. Initially, it was anticipated to have a sample size of N >50 for some of the empirical tests, such as exploratory factor analysis (EFA) discussed in Section 4.4.3 below. However, the responses collected to the survey questionnaire based on the availability of the candidates did not allow this. According to Fabrigar et al. (1999), in the scale development process, it is considered appropriate to use more than one independent sample for testing (hence the pre-study).

According to Hinkin (1998), the literature suggests that small samples of even 20 may be appropriate for EFA analyses. De Winter, Dodou and Wieringa (2009:153) even stated:

> *…lower sample sizes were needed when the level of loadings (λ: therefore the commonalities) was high, the number of factors (f) small, and the number of variables (p) high. For loadings higher than .8 and one factor, even sample sizes smaller than 10 were sufficient for factor recovery. The level of loadings was a very strong determinant. For example, when loadings were as high as .9 and even with a high number of factors (f=4) and a limited number of variables (p=12), a sample size of 12 sufficed. A larger number of variables improved factor recovery, particularly when loadings were low.*

There are of course still potential limitations to such a small sample size. In summary, however, the sample size of this pre-study was deemed sufficient for the anticipated outcomes, namely to conduct EFA, to empirically test the reliability and validity of the ERMVS and to determine a potential underlying factor structure for further testing. It is important to recognise that the results need to be interpreted within the context of these limitations of this relatively small sample size.

All of the risk managers were asked to complete a survey questionnaire rating the 23 ERMVS items on a Likert scale with five points. Table 4.5 below presents the descriptive statistics for the

pre-study survey results. For the most part, respondents utilised the range of the scale, though the upper range of importance scores (i.e. 4 and 5) was favoured as can be demonstrated by the high mean scores. These results were expected with the respondents being risk management practitioners scoring ERM values items that were identified as most important by the expert group.

Table 4.5: Descriptive statistics for the pre-study sample

Variable	Observations	Mean	Std. Dev.	Min	Max
rm_cc_02_escalation	36	4.78	0.48	3	5
rm_cc_10_relationships	35	4.60	0.60	3	5
rm_ci_13_employeesimproving	36	4.67	0.53	3	5
rm_ci_14_learnings	36	4.67	0.48	4	5
rm_ec_01_riskculture	35	4.66	0.73	2	5
rm_ec_15_understandroles	36	4.81	0.47	3	5
rm_fd_06_embedded	36	4.83	0.45	3	5
rm_fd_07_tailored	36	4.69	0.52	3	5
rm_fd_05_policy	36	4.81	0.40	4	5
rm_mc_12_mgtcommunication	33	4.73	0.52	3	5
rm_mc_08_governance	34	4.74	0.51	3	5
rm_mc_11_rmauthority	35	4.63	0.65	3	5
rm_mc_20_execendoresement	35	4.71	0.57	3	5
rm_ra_03_comprehensiveness	35	4.69	0.53	3	5
rm_ra_04_regularbasis	35	4.69	0.58	3	5
rm_rm_09_actionplans	36	4.75	0.50	3	5
rm_rt_23_bumitigation	34	4.74	0.45	4	5
rm_ec_16_understandexternal	34	4.71	0.52	3	5
rm_fd_17_frameworkholistic	34	4.71	0.52	3	5
rm_mc_19_direction	36	4.75	0.50	3	5
rm_mc_18_execsponsor	34	4.71	0.52	3	5
rm_cc_21_quality	34	4.74	0.51	3	5
rm_fd_22_integration	36	4.83	0.45	3	5

4.4.2 Reliability of the main ERM values construct

The next step in the empirical analysis of the ERMVS was to test the reliability of the 23 measures (items) overall with regards to the broader ERM values construct. For this purpose, Cronbach's alpha (α) was calculated for the item set. According to Stata (2015), Cronbach's alpha assesses the reliability of a summative rating such as a Likert scale composed of the variables (items) specified. The set of items is often called a test or battery. A scale is the sum of the individual item scores correlated with the factor (in this case ERM values) being measured. The reliability α is defined as the square of the correlation between the measured scale and the underlying factor.

As reported in Table 4.6 below, the Cronbach's alpha scores for each of the items were high (column 7), above 0.9 in all cases, which for items measuring individuals is the minimum that "should be tolerated," according to Stata (2015). Furthermore, typically, the item-test correlations should be roughly the same for all items. Item-test correlations may not be adequate to detect items that fit poorly because the poorly-fitting items may distort the scale. Accordingly, it may be more useful to consider item-rest correlations (Nunnally & Bernstein, 1994), i.e. the correlation between an item and the scale that is formed by all other items. The average inter-item correlations of all items are shown in column 6.

Table 4.6: Cronbach's Alpha for pre-study ERMVS items

Item	Obs	Sign	item-test corr.	item-rest corr.	interitem corr.	alpha
rm_cc_02_escalation	36	+	0.6092	0.5536	0.3438	0.9202
rm_cc_10_relationships	35	+	0.5956	0.5441	0.3439	0.9202
rm_ci_13_employeesimproving	36	+	0.4276	0.3613	0.3569	0.9243
rm_ci_14_learnings	36	+	0.6138	0.5626	0.3420	0.9196
rm_ec_01_riskculture	35	+	0.6270	0.5785	0.3410	0.9193
rm_ec_15_understandroles	36	+	0.6599	0.6133	0.3386	0.9184
rm_fd_06_embedded	36	+	0.6457	0.5979	0.3402	0.9190
rm_fd_07_tailored	36	+	0.4251	0.3615	0.3541	0.9234
rm_fd_05_policy	36	+	0.3711	0.3043	0.3568	0.9243
rm_mc_12_mgtcommunication	33	+	0.8279	0.8018	0.3309	0.9158
rm_mc_08_governance	34	+	0.8236	0.7969	0.3306	0.9157
rm_mc_11_rmauthority	35	+	0.6721	0.6282	0.3395	0.9187
rm_mc_20_execendoresement	35	+	0.6988	0.6563	0.3384	0.9184
rm_ra_03_comprehensiveness	35	+	0.7172	0.6756	0.3371	0.9179
rm_ra_04_regularbasis	35	+	0.6729	0.6274	0.3402	0.9190
rm_rm_09_actionplans	36	+	0.5723	0.5146	0.3468	0.9211
rm_rt_23_bumitigation	34	+	0.5576	0.5027	0.3459	0.9209
rm_ec_16_understandexternal	34	+	0.4396	0.3763	0.3532	0.9232
rm_fd_17_frameworkholistic	34	+	0.5913	0.5401	0.3439	0.9202
rm_mc_19_direction	36	+	0.7565	0.7219	0.3341	0.9169
rm_mc_18_execsponsor	34	+	0.5581	0.5049	0.3462	0.9209
rm_cc_21_quality	34	+	0.5162	0.4581	0.3481	0.9216
rm_fd_22_integration	36	+	0.6340	0.5848	0.3405	0.9191
Test scale					0.3432	0.9232

In conclusion, there were some items, such as *rm_fd_05_policy* which loaded lower on the scale, and some such as *rm_mc_12_mgtcommunication* which loaded higher, but at this beginning stage

of the scale development, it did not make sense to necessarily exclude any items based on the results above. Scores above 0.30 were deemed significant for the purposes of this study. As such, all items comprising the full ERMVS were taken into the next step of the validation process, the exploratory factor analysis (EFA) discussed in the following section.

4.4.3 Exploratory Factor Analysis (EFA)

As discussed in the methodology chapter in Section 3.7, EFA is one of the most widely-used statistical procedures in a variety of academic disciplines with regards to determining an underlying sub-construct structure in the data. Over the past decades, before the advent of significantly-improved computing power, the combination of Principal Components Analysis (an alternative to the factor model) Eigenvalues greater than one (1) and Varimax rotation of the factor model was even dubbed the “Little Jiffy”, according to Conway and Huffcutt (2003) because of the ease of which it could analyse underlying factor structures. According to Fabrigar et al. (1999:275), EFA is used “when a researcher wishes to identify a set of latent constructs underlying a battery of measured variables”, in the case of this study, the ERMVS. In order to determine whether there are second-order constructs within the ERMVS, EFA was conducted on the pre-study data.

EFA requires the researcher to make several important decisions with respect to how the analysis is performed (Fabrigar et al., 1999). These include at least five major methodological considerations including:

- Deciding the variables to include in the study and determining the appropriate sample;
- Confirming whether EFA is the most appropriate form of analysis given the goals of the research project;
- Assuming that EFA is appropriate, designating a specific procedure to fit the model to the data;
- Determining the number of factors in the model; and
- Selecting the appropriate method for rotating the initial factor analytic solution to a final solution that can most readily be interpreted.

The EFA literature explicitly discusses how the above decisions by the researcher can have important consequences for the results obtained (Fabrigar et al., 1999).

In terms of this study, the first two considerations were addressed in the preceding sections, and thus the next step in the EFA process was to conduct a preliminary, unrotated and unspecified model EFA, the results of which are exhibited in Table 4.7 below.

Table 4.7: Pre-study preliminary factor analysis model

Factor analysis/correlation		**Number of observers = 28**		
Method: principal factors		**Retained factors = 19**		
Rotation: (unrotated)		**Number of parameters = 253**		
Factor	**Eigenvalue**	**Difference**	**Proportion**	**Cumulative**
Factor 1	9.39526	6.86166	0.4143	0.4143
Factor 2	2.53360	0.29144	0.1117	0.5261
Factor 3	2.24216	0.21664	0.0989	0.6250
Factor 4	2.02552	0.63626	0.0893	0.7143
Factor 5	1.38926	0.17270	0.0613	0.7756
Factor 6	1.21656	0.30959	0.0537	0.8292
Factor 7	0.90698	0.17286	0.0400	0.8692
Factor 8	0.73412	0.07781	0.0324	0.9016
Factor 9	0.65631	0.11431	0.0289	0.9305
Factor 10	0.54199	0.24865	0.0239	0.9544
Factor 11	0.29334	0.05768	0.0129	0.9674
Factor 12	0.23566	0.05691	0.0104	0.9778
Factor 13	0.17875	0.02185	0.0079	0.9856
Factor 14	0.15689	0.06319	0.0069	0.9926
Factor 15	0.09370	0.04277	0.0041	0.9967
Factor 16	0.05093	0.02994	0.0022	0.9989
Factor 17	0.02099	0.01595	0.0009	0.9999
Factor 18	0.00504	0.00315	0.0002	1.0001
Factor 19	0.00189	0.00189	0.0001	1.0002
Factor 20	0.00000	0.00000	0.0000	1.0002
Factor 21	0.00000	0.00000	0.0000	1.0002
Factor 22	-0.00000	0.00371	-0.0000	1.0002
Factor 23	-0.00371	.	-0.0002	1.0000

The results indicated that there were many factors in this preliminary output, with the first factor showing an Eigenvalue of over nine (9) and providing > 41% (Column 4) of the explanatory power for the domain construct (ERM values). After testing the preliminary factor loadings, a scree plot was generated to better inform possible factor structure. According to Fabrigar et al. (1999), the scree test is another widely-known approach for determining the number of factors in a model or scale. "In this procedure, the eigenvalues of the correlation matrix are computed and then plotted in order of descending values. The graph is then examined to identify the last substantial drop in the magnitude of the eigenvalues" (Fabrigar et al., 1999:278).

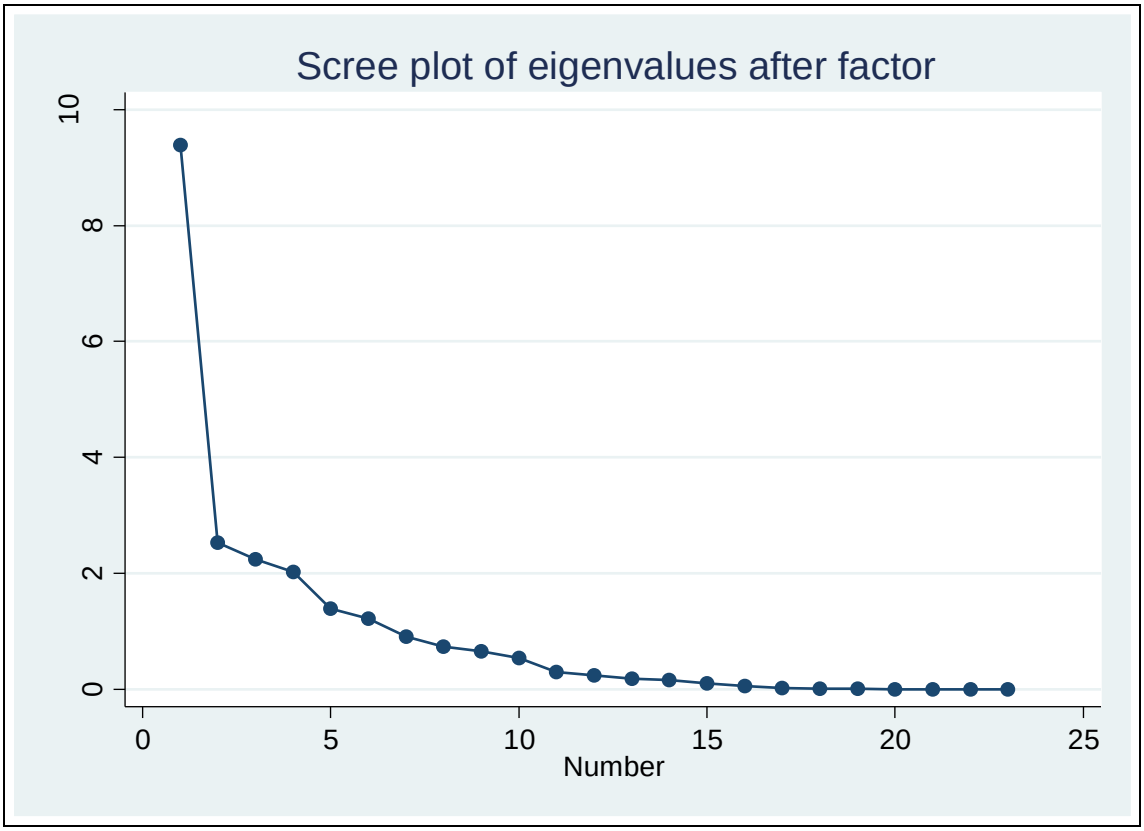

Figure 4.4: Scree plot of Eigenvalues of pre-study preliminary factor analysis

The scree plot is exhibited in Figure 4.4, and it is clear to see that the first and sharpest bend (almost a right-angle break) is at factor number two. In other words, after factor two, there is much less significant contribution to the explanatory power of the factors to the overall model.

Another test to determine the potential number of factors in the model is a scatterplot of the variable (item) scores on the initial factor analysis. According to Tabachnick, Fidell and Osterlind (2001) the researcher needs to look at the distance, clustering and direction of the points on the scatterplot relative to the factor axes. If the clusters fall between the axes, i.e. they are not at 90 degrees this shows that the factors potentially exhibit correlation. In this case, oblique rotation is preferred, and it may reveal substantial correlation among factors. The results of such a plot on the pre-study factor analysis data are shown in Figure 4.5 below. These results also potentially indicate a two-factor model based on the cluster pattern of the items.

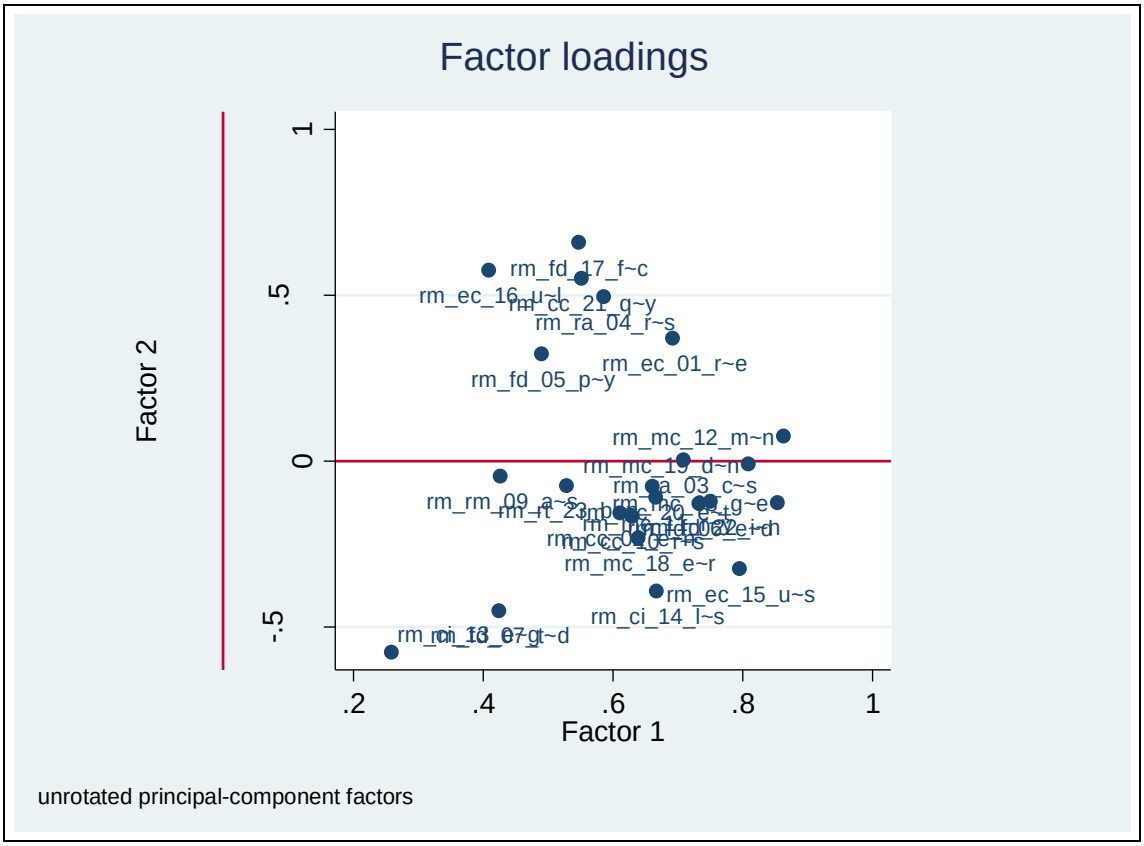

Figure 4.5: Scatterplot of items in preliminary unrotated principal component factor analysis

On the basis of these two tests, a two-factor model was chosen for the next step in the EFA process, namely further testing of the data loaded on a two-factor model. The results of this factor analysis on a forced two-factor model are exhibited in Table 4.8 below.

Table 4.8: Pre-study preliminary factor analysis of the forced two-factor model

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor 1	9.40282	6.82632	0.4088	0.4088
Factor 2	2.57650	0.32684	0.1120	0.5208
Variable		**Factor 1**	**Factor 2**	**Uniqueness**
rm_cc_02_escalation		0.6098	-0.1684	0.5998
rm_cc_10_relationships		0.6288	-0.1640	0.5778
rm_ci_13_employeesimproving		0.2585	-0.5574	0.6225
rm_ci_14_learnings		0.6661	-0.3887	0.4053
rm_ec_01_riskculture		0.6919	0.3613	0.3907
rm_ec_15_understandroles		0.7945	-0.3214	0.2655
rm_fd_06_embedded		0.7323	-0.1340	0.4458
rm_fd_07_tailored		0.4296	-0.4745	0.5902
rm_fd_05_policy		0.4897	0.3108	0.6636
rm_mc_12_mgtcommunication		0.8619	0.0704	0.2522
rm_mc_08_governance		0.8523	-0.1303	0.2566
rm_mc_11_rmauthority		0.6648	-0.0990	0.5482
rm_mc_20_execendoresement		0.6595	-0.0704	0.5601
rm_ra_03_comprehensiveness		0.7079	0.0056	0.4988
rm_ra_04_regularbasis		0.5859	0.4946	0.4120
rm_rm_09_actionplans		0.4258	-0.0405	0.8171
rm_rt_23_bumitigation		0.5284	-0.0761	0.7150
rm_ec_16_understandexternal		0.4140	0.6018	0.4664
rm_fd_17_frameworkholistic		0.5535	0.6842	0.2255
rm_mc_19_direction		0.8080	-0.0155	0.3469
rm_mc_18_execsponsor		0.6383	-0.2235	0.5426
rm_cc_21_quality		0.5513	0.5508	0.3927
rm_fd_22_integration		0.7493	-0.1149	0.4253

In summary, the results of Table 4.8 indicate that the two factors demonstrate a cumulative explanation of the ERMV construct of approximately 52 percent. The individual item loadings on the two factors are noted. As this model was not yet optimised, the next and final step of the EFA process was to determine the rotation of the model.

According to Stata (2015), in oblique rotations new axes stemming from the rotation are free to take any position in the factor space. The degree of correlation, however, allowed in the oblique rotation among factors is, in general, small because in many cases, two highly-correlated factors are better interpreted as only one factor. Oblique rotations, therefore, relax the orthogonality constraint in order to gain simplicity in the interpretation. In other words, if the proposed factors are considered not at all correlated, an orthogonal rotation is preferred. In the case of this study,

individual factors comprising the greater ERMV construct could be considered to correlate, so the oblique rotation was selected.

Regarding the differences between orthogonal and oblique rotations, Tabachnick et al. (2001:646) argued that "perhaps the best way to decide between orthogonal and oblique rotation is to request oblique rotation (e.g., direct oblimin or promax) with the desired number of factors and look at the correlations among factors. If factor correlations are not driven by the data, the solution remains nearly orthogonal. If in the factor correlation matrix correlations exceed 0.32, then there is ten percent (or more) overlap in variance among factors; enough variance to warrant oblique rotation unless there are compelling reasons for orthogonal rotation". Strong solutions should not be "hidden" by different rotations, and there should be similar patterns in the data.

Gorsuch (1983) listed 15 different oblique methods namely binormamin, biquartimin, covarimin, direct oblimin, indirect oblimin, maxplane, oblinorm, oblimax, obliquimax, optres, orthoblique, orthotran, promax, quartimin, and tandem criteria. Stata is not quite so ambitious, but has a number of options of which several were tested with similar results. The oblique rotation which was representative of the others and provided the most "simple structure" was oblique promax with Kaiser (normalisation) on. As is depicted in the results in Table 4.9 below, all the items loaded on one of the two factors with this rotation.

As discussed above, exploratory factor analysis is just what the name implies – a methodology to *explore* the underlying latent (hidden) factor structure based on observed (manifest) variables or items. In linking the ERM theory with the statistical outputs of the EFA, the two factors emanating from the EFA were investigated in terms of the theoretical ERM values construct domain generated from the literature reviewed in this dissertation.

The introduction of the dissertation began with a discussion of Knight's (1921) view of "organic" and "mechanistic" aspects of risk and uncertainty, and this has been a thread through the dissertation, whereby aspects of the ISO 31000 (2009) ERM framework exhibited mechanistic and organic qualities. The review of the ERM landscape in Chapter 2 of the study, particularly within the introduction to risk management in Section 2.2 and the risk culture thread discussed in Section 2.8, examined contingency theory, "calculative and non-calculative cultures" and the link to organic and mechanistic structures in organisations.

To re-visit the original classification matrix of Burns and Stalker (1961) exhibited in Table 2.1 in Section 2.2, the majority of the 23 ERM values items can be classified as either organic or mechanistic utilising this matrix. It is thus hypothesised, that the two factors emanating from the EFA model could potentially be determined as 'organic' and 'mechanistic' constructs, indicated by the yellow and green highlighting in Table 4.9 below. In Column 5, based on the above theoretical considerations, each item was marked as potentially 'organic' (O), 'mechanistic' (M) or 'neutral' (-), based on classification within the Burns and Stalker (1961) matrix (Table 2.1). As such, whilst some items load 'incorrectly' on the factors, such as *rm_cc_02_escalation*, the majority of the

factor loadings tie in with theoretical considerations. This warrants further exploration in a future research direction. However, the determination of whether the items are organic or mechanistic should be replicable by other researchers utilising the matrix.

Table 4.9: Pre-study rotated two-factor analysis model – oblique promax with Kaiser on

Factor analysis/correlation		**Number of observers = 28**		
Method: principal-component factors		**Retained factors = 2**		
Rotation: oblique promax (Kaiser on)		**Number of parameters = 45**		
Variable	**Factor 1**	**Factor 2**	**Uniqueness**	**Organic vs. Mechanistic**
rm_cc_02_escalation	0.6102	0.0491	0.5998	M
rm_cc_10_relationships	0.6216	0.0607	0.5778	O
rm_ci_13_employeesimproving	0.6360	-0.4854	0.6225	O
rm_ci_14_learnings	0.8254	-0.1596	0.4053	O
rm_ec_01_riskculture	0.2634	0.6312	0.3907	O
rm_ec_15_understandroles	0.8742	-0.0422	0.2655	-
rm_fd_06_embedded	0.6797	0.1301	0.4458	O
rm_fd_07_tailored	0.7062	-0.3361	0.5902	O
rm_fd_05_policy	0.1437	0.5041	0.6636	M
rm_mc_12_mgtcommunication	0.6229	0.3908	0.2522	O
rm_mc_08_governance	0.7713	0.1781	0.2566	M
rm_mc_11_rmauthority	0.5996	0.1416	0.5482	M
rm_mc_20_execendoresement	0.5732	0.1695	0.5601	M
rm_ra_03_comprehensiveness	0.5522	0.2665	0.4988	O
rm_ra_04_regularbasis	0.0766	0.7311	0.4120	M
rm_rm_09_actionplans	0.3662	0.1145	0.8171	O
rm_rt_23_bumitigation	0.4745	0.1152	0.7150	O
rm_ec_16_understandexternal	-0.1418	0.7794	0.4664	M
rm_fd_17_frameworkholistic	-0.0961	0.9166	0.2255	M
rm_mc_19_direction	0.6473	0.2814	0.3469	-
rm_mc_18_execsponsor	0.6754	0.0022	0.5426	-
rm_cc_21_quality	0.0057	0.7768	0.3927	M
rm_fd_22_integration	0.6783	0.1563	0.4253	O

Using variable *rm_ci_13_employeesimproving* (row 3) as one example, there is a significant positive loading of 0.6360 on the 'organic'" construct and a significant negative loading of -0.4854 on the 'mechanistic' factor. Theoretically, as can be seen in the variable description in either the full table of items in Appendix A or in Table 4.1, the item representing continual improvement of employees in terms of risk management is a focal point of the ISO 31000 (2009) framework.

Improvement by its nature is strongly organic, exhibiting a strong association with items 3 and 10 on the organic side of the Burns and Stalker (1961) matrix (Table 2.1). The item *rm_fd_07_tailored* (row 8) is another example of a significant positive organic loading also negatively loading on mechanistic factor, whereby customising or tailoring ERM by its definition fits exceptionally to the organic classification.

These theoretical considerations were taken into account in setting the model for the ensuing CFA testing discussed in Section 4.5.2. Keeping in mind the relatively small sample size for this EFA, theoretical considerations linked with the EFA outputs could, and in fact should also, effect the optimisation of the factor model after CFA, i.e. the dropping or amending of items, cross-loading of items etc. These findings and the future research directions are discussed in more detail in the conclusion chapter.

Table 4.10 below shows the factor rotation matrix of the selected model, which is also graphically depicted in Figure 4.6.

Table 4.10: Factor rotation matrix for pre-study two-factor model

	Factor 1	**Factor 2**
Factor 1	0.9428	0.7027
Factor 2	-0.3333	0.7115

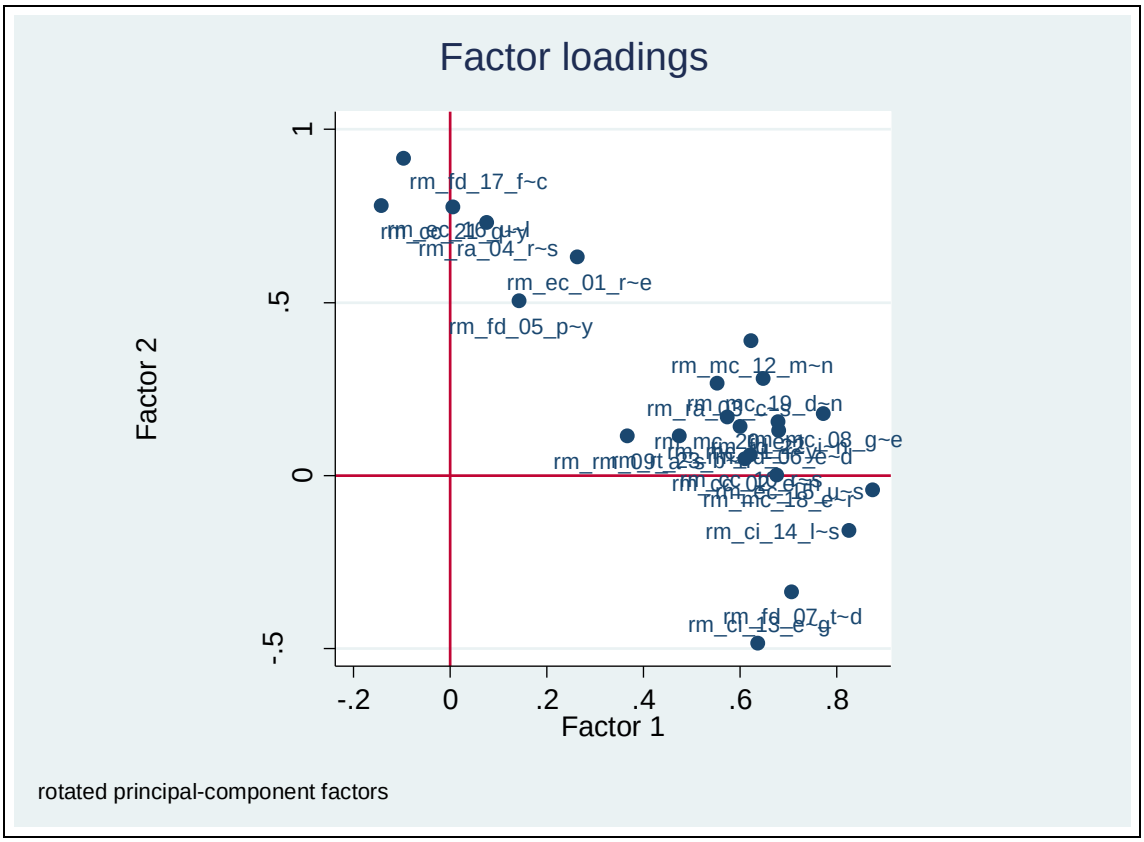

Figure 4.6: Scatterplot of items in the rotated oblique principal component factor analysis

Figure 4.6 represents the updated scatterplot of the items on the new, rotated oblique two-factor model. One can clearly see the potential for a two-factor structure with only several outliers. The fact that the clusters have moved more directly towards the axes, particularly in the case of Factor 2, also demonstrates that the oblique rotation had the anticipated effect of appropriate adjustment.

In conclusion, Section 4.4 has discussed the results and findings of the pre-study, which provided further empirical testing of the ERMVS taken forward from the expert group investigation. The main outcome of the pre-study was the development of a two-factor model through EFA which demonstrated significant loading by all the 23 ERMVS items on one of the two factors. This model was taken into the main study to perform additional tests of reliability and validity, such as CFA, and provide further empirical testing and development of the ERMVS and its related constructs.

4.5 THE MAIN STUDY

4.5.1 Sample and descriptive statistics

As discussed in the methodology chapter, the sample for the main study was comprised of associates of IRMSA, namely, risk professionals predominantly based in Sub-Saharan Africa. The sample size of N=327 (not all participants responded to all items) was well over the 200 participants generally recommended as the rule of thumb for structural equation modeling (SEM) analysis which is utilised in this study for CFA as discussed below. Schermelleh-Engel, Moosbrugger and Müller (2003) suggested a conservative estimate of a sample for CFA where N should be ten times the number of free parameters (variables). In the case of this study and the main study sample, that would mean greater than 23 times ten or a sample of more than 230 (N > 230). This study's sample size of 327 comfortably exceeds the suggested 230.

The descriptive statistics of the full main study dataset is provided in Appendix F. In summary, at a high level these statistics include the mean scores and standard deviations for the risk management items denoted by 'rm' with the one overall and two second-order ERMV constructs, cultural items, denoted by 'g' for GLOBE and 'h' for Hofstede. Furthermore, the demographic variables are noted, as these do not have numerical values.

4.5.2 Reliability of constructs

The item sets within the two-factor model were tested for reliability by means of Cronbach's alpha. The results are given in Table 4.11 and Table 4.12 below. In summary, the items were found to load reliably on both factors. The alphas were all > 0.95 for Factor 1 and 0.85 or greater for Factor 2. These results are aligned with the results from the EFA, whereby the scatterplots showed that Factor 2 had a less consistent structure (Figure 4.6). The reliability testing also points towards potential adaptation or modification of the two-factor model taking into consideration the

modification indices from the CFA discussed above and the loading factors in the EFA results of the model. Certainly, there is a strong tendency for loading on Factor 1.

Table 4.11: Reliability for the ERMV Construct 1

Item	Obs	Item-test corr.	Item-rest corr.	Interitem cov.	alpha
rm_cc_02	326	0.7049	0.6586	0.472202	0.9571
rm_cc_10	324	0.6920	0.6478	0.47714	0.9571
rm_ci_13	326	0.7166	0.6697	0.4686721	0.9570
rm_ci_14	323	0.7402	0.7000	0.4702414	0.9562
rm_ec_15	320	0.7426	0.7088	0.4775922	0.9561
rm_fd_06	325	0.8411	0.8181	0.4686489	0.9543
rm_fd_07	323	0.7622	0.7284	0.472839	0.9557
rm_mc_12	324	0.8239	0.7941	0.4603517	0.9546
rm_mc_08	324	0.8720	0.8509	0.4593309	0.9536
rm_mc_11	321	0.6821	0.6340	0.4741838	0.9575
rm_ra_03	323	0.7363	0.7039	0.4811477	0.9562
rm_mc_20	323	0.7944	0.7672	0.4744727	0.9552
rm_rm_09	325	0.8240	0.7975	0.4680713	0.9546
rm_rt_23	325	0.8251	0.7993	0.4677766	0.9546
rm_mc_19	325	0.8417	0.8172	0.4643812	0.9542
rm_fd_22	325	0.8364	0.8130	0.468887	0.9544
rm_mc_18_	325	0.7568	0.7190	0.4688053	0.9559
Test scale				0.4702808	0.9581

Table 4.12: Reliability for the ERMV Construct 2

Item	Obs	item-test corr.	item-rest corr.	Interitem cov.	alpha
rm_ec_01	321	0.8341	0.7501	0.3771504	0.8481
rm_fd_05	322	0.8214	0.7276	0.3919805	0.8575
rm_ra_04	324	0.7285	0.6053	0.413779	0.8713
rm_fd_17	322	0.8258	0.7387	0.3830021	0.8503
rm_ec_16	321	0.8328	0.7539	0.3869714	0.8494
rm_cc_21	324	0.7382	0.5990	0.399943	0.8754
Test scale				0.3921285	0.8795

The reliability of the culture values dimensions replicated in this sample, and tested at sub group level, can be found in Appendix J.

4.5.3 Confirmatory Factor Analysis (CFA)

Fabrigar et al. (1999) expounded on the paradigm for scale development by stating that it is useful to utilise EFA and CFA in conjunction with one another, whereby an EFA is conducted in an initial study to provide the basis for specifying a CFA in a subsequent model. The basic definition of CFA and why it was utilised as a methodology in this study was discussed in Section 3.8. "CFA requires a researcher to specify a specific number of factors as well as to specify the pattern of zero and non-zero loadings of the measured variables on the common factors" (Fabrigar et al., 1999:277). According to Hinkin (1998), it is recommended that after EFA, CFA be conducted using the item variance-covariance matrix computed from data collected from a second, independent sample. In the case of this study, this second sample is the main study sample. According to Asparouhov and Muthén (2009:398), "The use of CFA measurement modelling in SEM has the advantage that researchers are encouraged to formalize their measurement hypotheses and develop measurement instruments that have a simple measurement structure". The main difference that SEM adds from CFA is the directionality of the relationships between the variables.

> *In structural equation modeling (SEM), a model is said to fit the observed data to the extent that the model-implied covariance matrix is equivalent to the empirical covariance matrix. Once a model has been specified and the empirical covariance matrix is given, a method has to be selected for parameter estimation (Schermelleh-Engel et al.,2003).*

The steps in the process of CFA or SEM methodology can be seen in the flowchart in Figure 4.7 below.

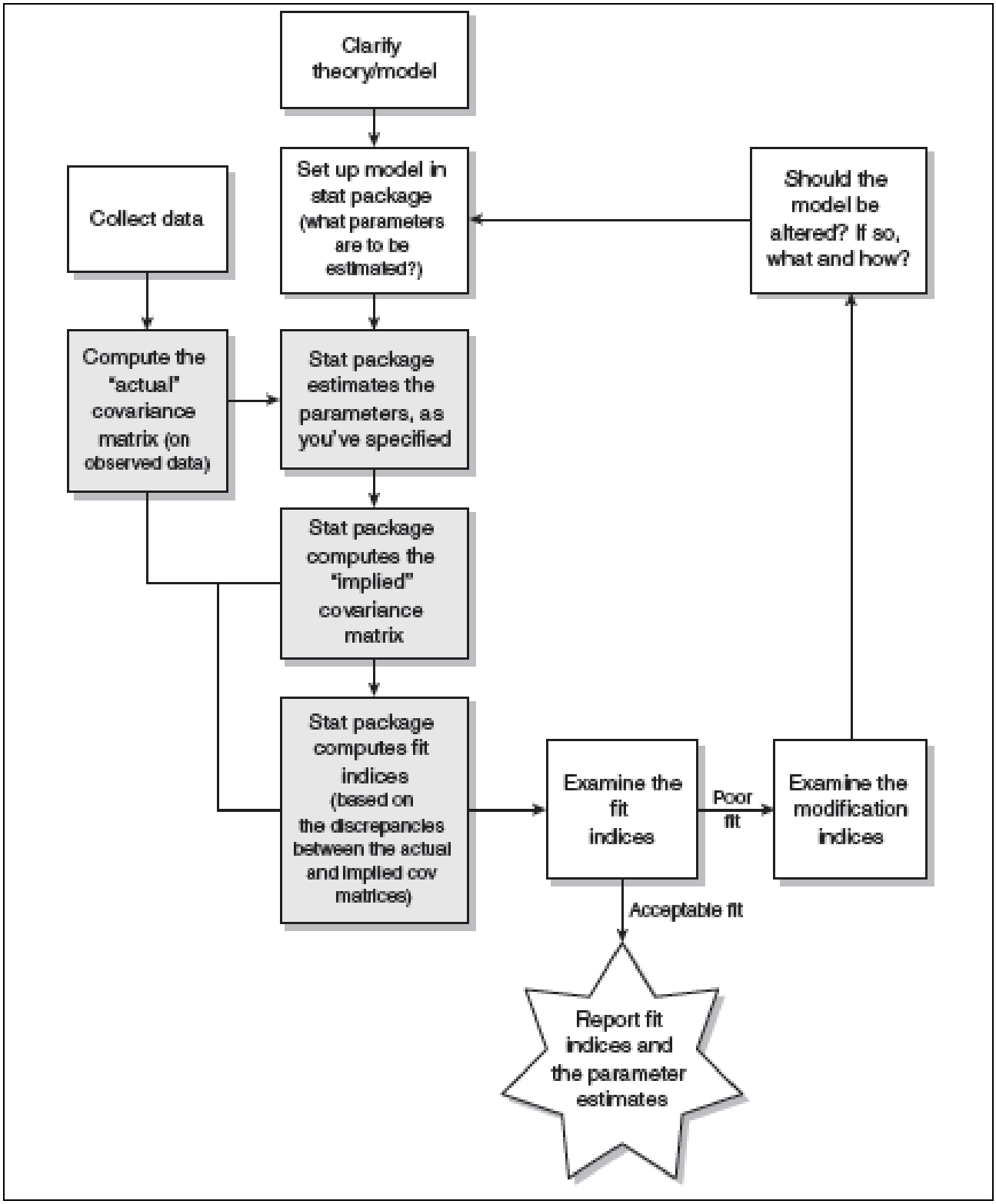

Figure 4.7: Flowchart of CFA and SEM

Source: Furr, 2011:93.

As has been discussed throughout this study, in the decades since the first articles were published on the topic of CFA, computer software has advanced in maturity and computing power providing the formulas for calculating a variety of “goodness-of-fit” (GoF) statistics for the CFA models. Following on these advances, in the 1990s, there was an increased attention to more complex GoF

indices. Hinkin's (1998) review of the literature showed over 30 in use for CFA at the time. For much of the testing within this dissertation, the Stata software was utilised for statistical analysis of the data – as was outlined in the discussion of EFA above. This statistical analysis continued with the empirical CFA testing. Tests were conducted utilising the structural equation model (SEM) features of Stata. The details and results of the specific indices calculated for CFA in this study are discussed below.

Consensus on what exactly is a "good fit" of a model for CFA does not exist, and thus a variety of empirical tests must be considered. For structural equation models, a huge variety of fit indices have been developed which can point to conflicting conclusions about the extent to which a model actually matches the observed data. In structural equation modelling, the evaluation of model fit is not as straightforward as it is in statistical approaches based on variables measured without error. Because there is no single statistical significance test that identifies a correct model given the sample data, it is generally necessary to take multiple criteria into consideration and to evaluate model fit on the basis of various measures simultaneously. For each estimation procedure, a large number of goodness-of-fit indices is provided in the literature to judge whether the model is consistent with the empirical data.

> *The choice of the estimation procedure depends on the type of data included in the model. Generally, the fit criteria of a structural equation model indicate to what extent the specified model fits the empirical data. Only one goodness-of-fit measure, i.e., the* $\chi 2$ *test statistic (chi-square statistic), has an associated significance test, while all other measures are descriptive.* (Schermelleh-Engel et al., 2003:24, 31).

For the purposes of this dissertation, it was important to remember that the factor model of this study is still a relatively "simple" model that is being empirically tested as part of the ERMVS and construct development process. The empirical-testing process is meant to be robust and carry as many items through as many iterations as possible to best optimise the ERMVS – not necessarily to maximise the GoF results for reporting purposes. All the 23 ERMV items (variables) were loaded on the main two-factor model examined in the CFA analysis as per the outputs of the EFA presented in Section 4.4.3 – despite some relatively borderline loadings in the EFA as previously indicated. The impact of removing those variables with borderline loadings from the CFA is discussed at the end of this section. The depiction of the model inputted for the CFA analysis is exhibited in Figure 4.8 below.

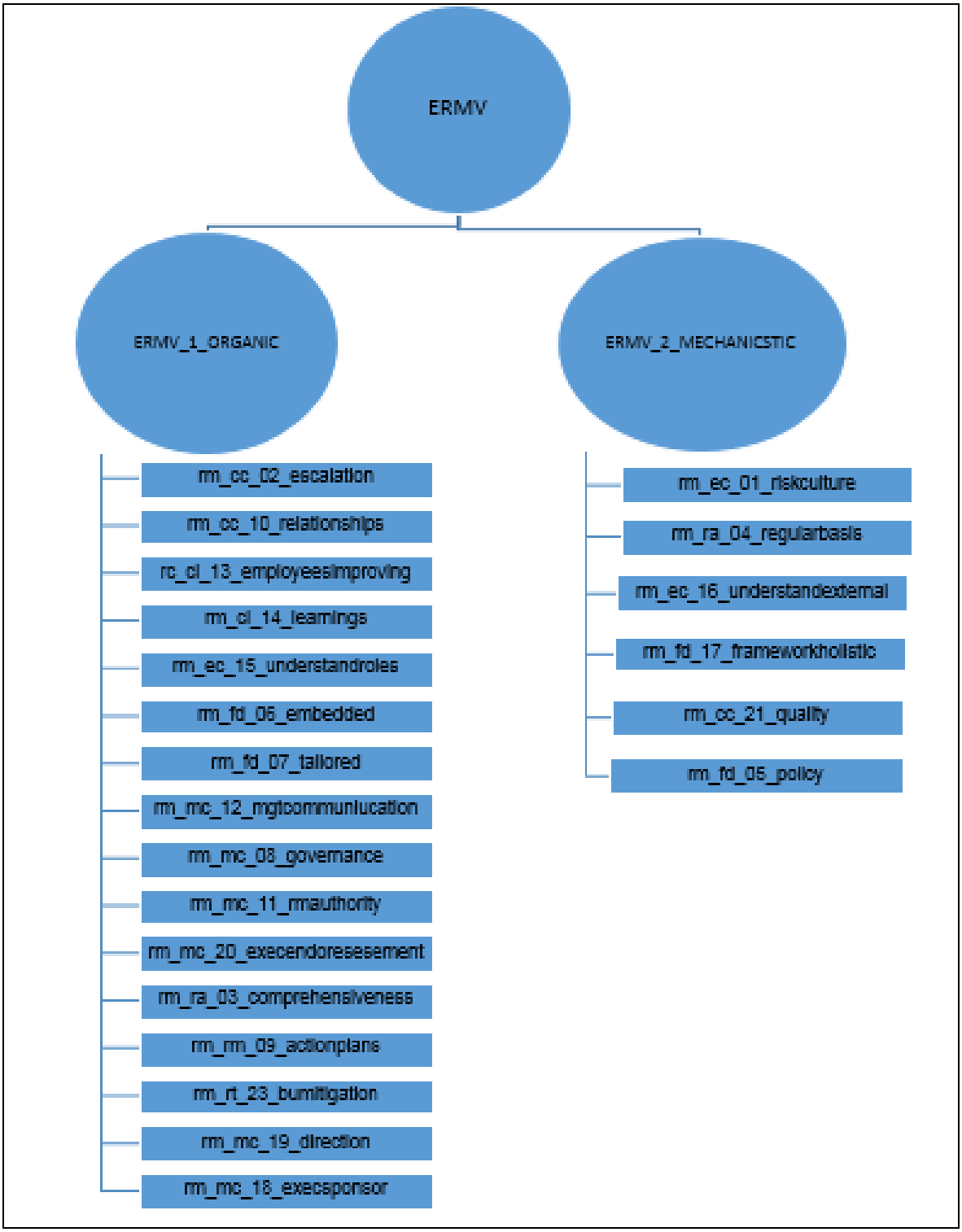

Figure 4.8: The CFA item structure for the two-factor model

The detailed outputs of the two-factor CFA model, in particular, the specific item loadings on each of the factors calculated in the SEM module of Stata are presented in Appendix G.

Table 4.13 below shows the GoF outputs for the selected two-factor ERMV model, which was run in the Maximum Likelihood (ML) parameter estimation setting. According to Schermelleh-Engel et al. (2003), ML is the most widely used fitting function for structural equation models. This method leads to estimates for the parameters which maximise the likelihood that the empirical covariance matrix is drawn from a population for which the model-implied covariance matrix is valid. Fabrigar et al. (1999:277) indicated that, for relatively normal distributed data, the "primary advantage of ML is that it allows for computation of a wide range of indexes of the goodness-of-fit model. ML also permits statistical significance testing of factor loadings and correlations among factors and the computation of confidence intervals for these parameters." The findings are discussed in the relevant sections below.

Table 4.13: Goodness-of-fit measures for the two-factor ERMV model

Fit statistic	Value	Description
Likelihood ratio		
chi2_ms(229)	1175.399	Model vs. saturated
p > chi2	0.000	
chi2_bs(253)	6074.599	Baseline vs. saturated
p > chi2	0.000	
Population error		
RMSEA	0.118	Root mean squared error of approximation
90% CI, lower bound	0.112	
upper bound	0.125	
pclose	0.000	Probability RMSEA <= 0.05
Information criteria		
AIC	12529.441	Akaike's information criterion
BIC	12787.529	Bayesian information criterion
Baseline comparison		
CFI	0.837	Comparative fit index
TLI	0.820	Tucker-Lewis index
Size of residuals		
SRMR	0.058	Standardized root mean squared residual
CD	0.974	Coefficient of determination

Kline (2015), in its third edition, considered the "handbook" of Structural Equation Models (SEM) proposes following several "rules of thumb" when assessing Goodness of Fit (GoF) as is applied to the outputs of Table 4.13. Each metric has its particular strengths and weaknesses, and was previously indicated, there is no one, single accepted approach to assessing GoF. As such a battery of measures applicable to this study and outputted by the Stata software is discussed in steps in the following sections.

They are:

- The chi-square statistic (chi2);
- The Root Mean Square Error of Approximation (RMSEA);
- The Standardized Root Mean Square Residual (SRMR);
- The Comparative Fit Index (CFI) and the Non-Normed Fit Index (NNFI) / the Tucker-Lewis Index (TLI);
- The Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC)

Hinkin (1998) explained that the chi-square statistic (chi2 or $\chi 2$) is utilised to assess the fit of a specific CFA model as well as compare different models to determine which fits better. Some authors view it as the gold standard of CFA because it is the only test with a binary output, i.e. it either provides a statistically-significant output or it does not. As a rule of thumb, the smaller the chi-square, the better the fit of the model. In general, high $\chi 2$ values in relation to the number of degrees of freedom indicate that the population covariance matrix and the model-implied covariance matrix differ significantly from each other – in other words there is a poor fit.

> *As the residuals… should be close to zero for a good model fit, the researcher is interested in obtaining a nonsignificant χ2 value with associated degrees of freedom. If the p-value associated with the χ2 value is larger than .05, the null hypothesis is accepted and the model is regarded as compatible with the population covariance matrix (*Schermelleh-Engel et al., 2003:24, 31).

The chi-square statistic, however, has a number of strong limitations, in particular its dependency on sample size. Therefore, in spite of its status, some authors such as Medsker, Williams, and Holahan (1994) recommended that the chi-square statistic should be used with caution. The closer $\chi 2$ is to the degrees of freedom of the model the better – a factor of three times the degrees of freedom is generally accepted as a reasonable value. However, according to Hinkin (1998:114), “a model with a large chi-square may still be a good fit if the indices are high”.

Referring back to Table 4.13, according to Stata (2015), the saturated model is the model that fits the covariances perfectly. In the baseline versus saturated test, the baseline model includes the means and variances of all observed variables plus the covariances of all observed exogenous variables. So, in the case of the data presented in Table 4.13, it is evident that the values in the first section represent a poor fit. The chi-square statistic is high (1 175) as it is greater than three times the degree of freedom (229), and furthermore it is statistically significant, i.e. < 0.05.

The second GoF criteria being assessed, the Root Mean Square Error of Approximation (RMSEA) is also one of the most popular descriptive GoF measures and is based on the chi-square value in terms of calculating it as a ratio to the population. The RMSEA is a measure of approximate fit in the population and therefore concerned with discrepancy due to approximation (Schermelleh-Engel et al., 2003).

According to Stata (2015), RMSEA reports the root mean squared error of approximation and its 90% confidence interval, and pclose, the p-value for a test of close fit, namely, RMSEA <0.05. Most interpreters of this test label the fit close if the lower bound of the Confidence Interval (i.e. 90%) is below 0.05 and label the fit poor if the upper bound is above 0.10, i.e. the score's range for an acceptable fit is generally between 0.05 and 0.10.

Analysis of the results in Table 4.13 indicates a borderline RMSEA score at 0.118, i.e. a score greater than 0.10, also indicating poor fit of our two-factor ERMV CFA model.

The third criteria, the Standardised Root Mean Square Residual (SRMR) can be termed an overall "badness-of-fit" measure, which is based on fitted residuals, according to Schermelleh-Engel et al. (2003). Stata (2015) indicated the SRMR is an absolute measure of fit and is defined as the standardised difference between the observed correlation and the predicted correlation. It is a positively-biased measure and that bias is greater for small N and for low df studies. Because the SRMR is an absolute measure of fit, a value of zero indicates perfect fit. The SRMR has no penalty for model complexity. A value less than 0.08 is generally considered a good fit (Hu & Bentler, 1999). Associated in terms of scrutinising the residuals is the Coefficient of Determination (CD), which according to Stata (2015), is like R-Squared for the whole model – a perfect fit corresponds to a CD of one (1).

The results in Table 4.13 with regards to SRMR and CD reflect positively and are the first to provide the un-modified base two-factor ERMV model with scores of a good fit. The SRMR is close to 0.5 at 0.58, which almost represents even an excellent fit, and the CD is approaching 1.0 with a score of 0.974.

There are furthermore, several descriptive measures for GoF based on model comparisons, or baseline comparisons, including the Comparative Fit Index (CFI) and the Non-Normed Fit Index (NNFI), of which the Tucker-Lewis Index (TLI) is an example. The basic idea of such comparison indices is that the fit of the model of interest is compared to the fit of some baseline model, most often the independence model. "The independence model assumes the observed variables are measured without error, i.e. all error variances are fixed to zero and all factor loadings to one, and that all variables are uncorrelated," according to Schermelleh-Engel et al. (2003:39). This baseline model is thus considered very restrictive. The CFI, similar to the NNFI and LTI ranges from a score of zero to one, with higher values indicating a better fit. According to Schermelleh-Engel et al. (2003), a general rule of thumb for the above noted indices based on model or baseline comparisons is that a value greater than 0.95 indicates a good fit.

As exhibited in Table 4.13, scores on both the CFI and TLI for the study's model were low, closer to 0.8 than 0.9, and thus indicated a poor fit of the model.

According to Schermelleh-Engel et al. (2003), the NNFI (and similarly the LTI) takes into account the degrees of freedom of the specified model as well as the degrees of freedom of the independence model into consideration. More complex, i.e. less restrictive models are thus penalised by a downward adjustment, while more parsimonious, i.e. more restrictive models, are rewarded by an increase in the fit index. This could relate to the base ERMVS model tested.

Descriptive measures for GoF based on information such as the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC) are in contrast to the RMSEA with its focus on the population factors, in that they take only the estimated model for the prediction of further observations. They thus reflect the search for a compromise between the approximation and estimation errors that minimises the overall error, according to Schermelleh-Engel et al. (2003). As a rule of thumb, for these types of information indices, a lower value signifies a better fit of the model. However, these indices are meant to be utilised as a supporting descriptive measure to compare competing models to determine which has the better fit, i.e. when comparing models, those with lower AIC or BIC scores are the better fit with regards to estimation errors.

As exhibited in Table 4.13, AIC and BIC scores are relatively large. These scores should, however, not be seen in isolation as discussed above. If compared to other models, and these indicators featured lower scores in the selected two-factor model, it would indicate a better fit than the alternative models.

Whilst the literature on CFA indicates that a comparison of a study's proposed model (in this case the two-factor ERMVS) to alternatives, such as a single-factor model or other multiple-factor models, is to be considered, this is not prescribed. Potential alternate models are discussed in the conclusion Section 4.6 of this chapter.

However, to demonstrate results of some potential examples of modifications to the selected two-factor model, the modification index analysis was run on the two-factor model in Stata.

Tables 4.14 and 4.15 show the effects the different variables have on the model if they are allowed to co-vary. Table 4.14 shows the latent variable effects and Table 4.15 is an extract of the manifest variable effects. Furthermore, the specific effects of all these potential modifications on GoF scores are noted. In CFA on the base two-factor ERMVS model, only the two second-order constructs, namely ERMV1 and ERMV2 are allowed to co-vary, and only those manifest variables specified from the EFA results are loaded onto the specified second-order constructs. The manifest variables are not allowed to co-vary in the base two-factor model – it is simple and restricted. In Table 4.14, in effect, the issue of potential cross-loading (as stemming from the EFA) is addressed, whereby the effects of significant cases of manifest variables being allowed to load on the other secondary construct are noted.

Table 4.14: Modification Indices (MI) for the two-factor model latent variables

						Standard
Measurement		**MI**	**df**	**P>MI**	**EPC**	**EPC**
rm_cc_02_escalation <-						
	ERMVS_2_Mechanistic	31.381	1	0.00	10.02262	7.123957
rm_cc_10_relationships <-						
	ERMVS_2_Mechanistic	5.997	1	0.01	4.063953	3.114122
rm_ci_13_employeesimproving <						
	ERMVS_2_Mechanistic	8.287	1	0.00	5.512406	3.668385
rm_ec_15_understandroles <-						
	ERMVS_2_Mechanistic	50.115	1	0.00	10.60239	8.567087
rm_fd_07_tailored <-						
	ERMVS_2_Mechanistic	20.819	1	0.00	6.995516	5.371884
rm_mc_12_mgtcommunication <-						
	ERMVS_2_Mechanistic	21.265	1	0.00	-7.206238	-4.886559
rm_mc_08_governance <-						
	ERMVS_2_Mechanistic	25.001	1	0.00	-6.48503	-4.6387
rm_mc_19_direction <-						
	ERMVS_2_Mechanistic	19.585	1	0.00	-6.035885	-4.523587
rm_fd_17_frameworkholistic <-						
	ERMVS_1_Organic	6.800	1	0.01	4.645012	3.693847
rm_ra_04_regularbasis <-						
	ERMVS_1_Organic	12.335	1	0.00	6.554442	5.033613
rm_ec_16_understandexternal <						
	ERMVS_1_Organic	4.940	1	0.03	-3.781096	-3.125954

In Table 4.15, which exhibits an extract of the full output, the effect of statistically-significant potential co-variance specifically between manifest variables is reported. The full output is exhibited in Appendix H.

Table 4.15: Extract of modification indices for two-factor model manifest variables

					Standard
Measurement	**MI**	**df**	**P>MI**	**EPC**	**EPC**
cov(e.rm_cc_02_escalation,e.rm_cc_10_relationships)	39.441	1	0.00	0.1587387	0.3763689
cov(e.rm_cc_02_escalation,e.rm_ci_13_employeesimproving)	9.131	1	0.00	0.0881431	0.1810599
cov(e.rm_cc_02_escalation,e.rm_ci_14_learnings)	8.036	1	0.00	0.0715415	0.1708347
cov(e.rm_cc_02_escalation,e.rm_fd_06_embedded)	5.867	1	0.02	-0.0441466	-0.149096
cov(e.rm_cc_02_escalation,e.rm_fd_07_tailored)	4.371	1	0.04	0.0485916	0.1260858
cov(e.rm_cc_02_escalation,e.rm_mc_12_mgtcommunication)	9.466	1	0.00	-0.0722515	-0.1876382
cov(e.rm_cc_02_escalation,e.rm_mc_20_execendorsement)	7.151	1	0.01	-0.0563755	-0.1614101

In Tables 4.14 and 4.15, four columns of results are reported:

- MI stands for modification index and is an approximation to the change in the model's goodness of fit if the path were added, i.e. the reduction in chi-squared.
- df stands for degrees of freedom and is the number that would be added to (df).
- P>MI is the value of the significance of (df).
- EPC stands for expected parameter change and is an approximation to the value of the parameter if it were not constrained to zero (0). It is reported in unstandardised and standardised units.

The modification indices report statistics on all omitted paths and covariances. Paths and covariances are listed only if the modification index is significant at the 0.05 level. One way of addressing these significant results would be to add direct paths between the variables, but that is very much linked to the theoretical issues behind the variables and constructs which are discussed in the conclusion of this chapter in Section 4.6.

Schermelleh-Engel et al. (2003:52) concluded their discussion of CFA by stating that, as has been demonstrated by a robust discussion of different goodness-of-fit indices in the literature, it is quite difficult to decide exact specifics on data-model fit or misfit, especially if various measures of model fit point to conflicting conclusions about the extent to which the model actually matches the observed data.

> *Although there are no well-established guidelines for what minimal conditions constitute an adequate fit, some rules of thumb exist … it should be clear that these rule of thumb cut-off criteria are quite arbitrary and should not be taken too seriously. Fit indices may be affected by model misspecification, small-sample bias, effects of violation of normality and independence, and estimation method effects. Therefore, it is always possible that a model may fit the data although one or more fit measures may suggest bad fit* (Hu & Bentler, 1998).

4.5.4 Cross-validation of the constructs: Correlation analysis

Having completed the steps in the scale and construct development process as outlined and discussed within this chapter so far for the new Enterprise Risk Management Values Scale, it can be stated with some confidence, according to Hinkin (1998:116), that it possesses content validity and internal consistency and reliability. However, "[f]urther evidence of construct validity can be determined by examining the extent to which the scales correlate with other measures designed to assess similar constructs (convergent validity) and to which they do not correlate with dissimilar measures (discriminant validity)."

Completing this stream of analysis is testing for criterion validity, which examines whether the measures correlate with other variables that they could be expected to. To test these three criteria, data from the main study sample was utilised, focusing on the cultural values constructs previously discussed (Hofstede and GLOBE) as well as selected demographic variables.

The tests for correlation between the ERMV factors and the demographic variables can be seen in Table 4.16 below.

Table 4.16: Correlation matrix of demographic variables and ERMV constructs 1 and 2

	ERMV_1_Org	ERMV_2_Mec	Age	Education	OrgSize	LevelMgt	OrgPerformance
ERMV_1_Org	1.0000						
	326						
ERMV_2_Mec	0.9315	1.0000					
	0.0000						
	326	326					
Age	-0.0445	-0.0700	1.0000				
	0.4295	0.2139					
	317	317	318				
Education	0.0599	0.0467	0.0029	1.0000			
	0.2873	0.4075	0.9591				
	317	317	316	318			
OrgSize	0.0700	0.0579	0.0778	-0.0684	1.0000		
	0.2122	0.3029	0.1671	0.2243			
	319	319	317	317	320		
LevelMgt	-0.0871	-0.1009	0.1958	0.1569	-0.5622	1.0000	
	0.1216	0.0728	0.0005	0.0053	0.0000		
	317	317	315	315	317	318	
OrgPerformance	-0.0024	-0.0356	0.1690	-0.0502	0.0945	-0.0091	1.0000
	0.9665	0.5275	0.0026	0.3730	0.0926	0.8715	
	318	318	316	317	318	316	319

The results represented by the correlation analysis indicate that whilst, as previously discussed, there is a high correlation between the two ERMV factors, there is no statistically-significant relationship between either of the two ERMV factors and the demographic variables. This is a confirmation of discriminant validity. The results indicate that some of the expected correlations between the demographic variables are present. For example, Level of Management is significant and positively correlated with Age and Education, whilst negatively correlated with Organisation Size. This leads to the conclusion that the data set accurately represents validity of those variables in the sample.

Table 4.17: Correlation matrix of culture values dimensions correlated with ERMV constructs 1 and 2

Main culture	Culture dimension	ERMV1	ERMV2	
Indian/Asian	h_mas_agg	-0.4309	-0.444	*Correlation*
		0.028	0.0231	*p-value*
		26	26	*N*
Coloured	g_po_agg	0.4436	0.4534	*Correlation*
		0.0299	0.0261	*p-value*
		24	24	*N*
	g_col_agg	0.5566	0.5476	*Correlation*
		0.0039	0.0046	*p-value*
		25	25	*N*
Black	h_uai_agg	0.2086	0.19	*Correlation*
		0.0079	0.0158	*p-value*
		161	161	*N*
	h_ivr_agg	-0.2043	-0.2001	*Correlation*
		0.0096	0.0112	*p-value*
		160	160	*N*
White	h_lto_agg	-0.2376		*Correlation*
		0.0204		*p-value*
		95		*N*

With regards to the cultural values dimensions, Table 4.17 above shows the results of the correlation analysis between the ERMV constructs 1 and 2 and the GLOBE and Hofstede culture dimensions aggregated at sub-group level for those cases where a statistically-significant ($p< 0.05$) relationship was detected. The sub-group level is indicated by the 'Main Culture' grouping of the respondents i.e. which broader South African designated population grouping the respondent associates themselves with. Appendix K also shows additional labels from the dataset, such as the country of the respondent or their ethnicity (a further sub-grouping within 'Main Culture' such as the tribe a respondent associates with), and whilst some preliminary tests were done with these data, there was uncertainty around the statistical power with these variables. For example, only two countries (South Africa and Zimbabwe) had the minimum number of respondents expected for correlation testing. In Table 4.17, sample size (N) is indicated for each correlated pair. The full correlation matrix for all ERM and culture variables, organised by Main Culture, can be found in Appendix K.

These statistically significant correlations exhibited in Table 4.17, represent outcomes of the null hypothesis testing of the cultural values dimensions which are outlined in Appendix I. It is important to note, that as is required by the culture values dimensions, the correlation testing was done at group level, and not at individual level. In other words, the correlation testing was done within the main culture sub-groups of the sample, also for the ERMV constructs.

The results above show that some of the null hypotheses detailed in Appendix I could in fact be rejected, for example, from Table 4.17 *"There is no statistically-significant relationship between ERMV 1 and LTO*". This implies that to a certain degree the NC values, as discussed in the literature, are associated with risk culture indicating convergent validity of the constructs. In terms of the effect of culture on ERM, cause and effect relationship cannot be determined based on these results, but there are interesting statistically significant relationships between the variables. For example, the relationship between ERMV 1 (Organic) and LTO outlined above as rejecting the null hypothesis (demonstrating a statistically significant relationship). 'White Cultures' are hypothesised as demonstrating a high LTO score (and also to score reliably on this measure) and it would be anticipated, based on analysis of the items comprising both the LTO and ERMV 1 that these two constructs are comprised of associated values items. In other words, a respondent with a high score on the Organic ERMV dimension i.e. a high rating on the organic ERM items value scale would also score LTO values items highly. As a future research direction, it would be well worth exploring further, which cultural dimensions are reliable in a sample, compiling within in the appropriate groups, and testing those in more detail for statistically significant relationships with the ERMV constructs.

4.6 CONCLUSION OF THE RESULTS CHAPTER

After presenting a view of the landscape of the study and analysis of the findings in the ERMVS development process, Chapter 4 presented the results and findings of three sets of empirical tests. The first set of tests investigated content validity, with a group of expert judges evaluating the importance of the pool of 102 reduced ERMVs measurement items (manifest variables). ICC was a test utilised to determine whether the judges agreed on their ratings of the items. The results of the ICC tests indicated that there was a small, albeit statistically significant, agreement by the judges on the importance of the items. The small SD in the judge's scores on the items may have contributed to discrepancies in agreement. The highest scoring items, those 23 items scoring one standard deviation above the mean, were selected to be included in the ERMVS for the pre-study. Further expert group review of the ERMVS items is recommended in future research, to address the ICC findings and ensure the validity of the instrument. Furthermore, ERM is an evolving field, and thus the ERMVS item pool will need continued development with the support of an expert group – these issues are discussed in further detail in section 5.4 below.

The goals of the pre-study were to test the reliability of the initial ERMVS, and to determine whether in a small sample, the ERMVS exhibited explanatory power for an ERM values construct. Furthermore, through EFA an empirical investigation was undertaken to test for possible second-order constructs comprising the ERM values construct domain, which contributed to further validity testing of the ERMVS. After selection of an oblique rotation of the model, and further examination of the factor loadings, the two factors were identified, which were considered to potentially represent Organic and Mechanistic constructs. The theoretical underpinnings for these factors, emanating from the literature reviewed in Chapter 2, were discussed above in Section 4.4. The outcome of the pilot/pre-study was a two-factor model representation of the ERMVS. This model featured statistically-significant loading, albeit not perfect loading, by all of the 23 items on either one of the factors, and was taken into the main study.

The main study, with a significantly larger sample, featured execution of a variety of methods around reliability and validity testing of the ERMVS. The two-factor model emanating from the pre-study formed the basis for CFA, which was conducted on the model by means of hypothesis testing of the simple model within the SEM module of Stata. The reliability of the items within the ERMVS as well as the GoF of the model were subjected to rigorous empirical investigation and fully reported on. Both factor scales were found to be reliable. However, whilst some measures demonstrated a good fit, the full two-factor model was also found to represent a poor fit on some of the parameters. In summary, the majority of the GoF parameters were either a good fit, or like the $\chi 2$ statistic, within reach of a good fit with some implementation of the recommendations of the modification indices.

As discussed in greater detail in the concluding Chapter 5, the goal of this study was to develop the ERMVS from its theoretical beginnings, and not specifically to finalise a factor model for a

subsequent iteration of empirical testing with a new sample. The model assessed in Table 4.13 for GoF is the culmination of a fully-loaded two-factor model CFA based on the theoretical underpinnings and EFA outputs. It represents a simple structure. In future research efforts, which are outside the remit of this dissertation, the CFA model can be modified based on theoretical underpinnings for testing on a new sample. For example, by going back to the EFA results and identifying those variables (statistically and theoretically) that are loading poorly or cross-loading, in conjunction with the results of the modification indices, the factor model could potentially be optimised in terms of GoF. Central to this are some of the modification possibilities exhibited in Tables 4.14 and 4.15. These modifications, for example, by eliminating error-inducing variables or adding paths between variables, could reduce the chi-square and RMSEA values, whilst improving the CFI and TLI scores. There are several permutations of possible modifications, which it must be cautioned need to be carefully considered as well as theory and hypothesis driven. Beyond the allegory of the “Little Jiffy”, the literature warns of researchers that selected those GoF measures best suited for their results. This study has not taken any shortcuts and provided a comprehensive set of results based on those tests recommended by the literature for testing reliability and validity in the scale and construct development methodology.

In the final stage of testing the ERMVS in the main study, the ERMVS was tested for the effect of culture. Cross-validation methods were applied in order to examine convergent, discriminant and criterion-related validity, and address the known issue of bias. This was carried out by testing the ERMVS for statistically-significant relationships with culture values dimensions from Hofstede and GLOBE, as well as against demographic variables from the study. Some of the culture values dimensions exhibited statistically-significant relationships (correlation) with the ERMV constructs, and so the ERMVS is well positioned for future research directions with regards to culture and other variables or correlates. This could include formal modification for a new, broader sample beyond risk managers, and testing with both the culture dimensions as well as different variables.

According to El Akremi, Gond, Swaen, De Roeck and Igalens (2015:2), a construct is multi-dimensional if it represents several distinct, related dimensions that can be treated as a single, higher-order, theoretical concept. “Higher-order multi-dimensional constructs facilitate theory building because they capture the heterogeneity of organisational phenomena while providing more parsimonious overall constructs.”

Much of the extensive ERM theory from Chapter 2 was distilled into the ERMVS. In the case of this study, the ERM values constructs were examined at multiple levels – at individual / item level, and at construct level, with the overall ERM Values construct comprised ultimately of 23 items loaded by the two sub-constructs that emanated from the exploratory factor analysis (mechanistic and organic). The ERMVS was rigorously tested with a number of empirical methods, and the results are promising, in particular explanatory power and factor structure of the model with its two proposed constructs, mechanistic and organic, and the clear path towards modification and

refinement. Ultimately, these constructs can also act to help predict work attitudes and behaviours, which is a significant contribution to the management sciences from both an academic and practitioner standpoint. One of the future research directions from this study is to further expand the theme of developing a higher order, multi-dimensional construct to act as an ERM values scale providing valid and reliable outputs for management sciences research and practice.

CHAPTER 5
CONCLUSION

5.1 INTRODUCTION

The adequate measurement of abstract constructs is perhaps the greatest challenge to understanding the behaviour of people in organizations (Hinkin, 1998:104).

The literature of Hinkin (1998) was a constant guide throughout the empirical work of this study, and so it is appropriate that the concluding chapter of the dissertation begins with a quote from him. His position is very much representative of the various authors such as MacKenzie et al. (2011) and Morgado et al. (2017), whose bodies of work greatly contributed to the depth and breadth of the methodology for developing the ERMVS and its constructs. The quote succinctly represents both the challenges and rewards of scale and construct development in the business and management sciences. Fundamentally, the business and management sciences are about people and organisations, figuring out how they work together and how they can succeed. One of the key ways of bridging the gap between academia and practice in the business and management sciences domain, is to develop empirical measurement scales for abstract constructs, such as enterprise risk management values, that measure phenomena incorporating people and organisations.

In terms of the business and management sciences, one of the focal points of management is to support an organisation in achieving its objectives and to increase value. As was discussed in depth in Chapter 2, risk and risk management have always been fundamental to the business and management sciences and central towards an organisation achieving its objectives and creating value. Knight's classical work (1921) focused on the topic of risk and uncertainty, and Drucker (1959) stated most clearly, that for enterprises, "to take risk is therefore the essence of economic activity". Where the global economy is becoming ever-more VUCA, it is clearly imperative for organisations to optimise risk-taking abilities and outcomes and risk management has perhaps even become more critical to enable an organisation to achieve its objectives. ERM represents a paradigm meant to do exactly that – it prescribes a framework for formalising the risk management process, and thus provides both opportunity and resilience for organisations in the face of uncertainty. However, recent global financial and economic crises have actually led both academics and practitioners to identify shortcomings in risk management as one the key causes of these crises (Van der Stede, 2011). Therefore, the study of ERM is at the top of the business and management sciences research agenda. Academics and practitioners acting in combination will

determine and optimise ERM's effectiveness for risk resilience and the benefit and success of organisations in the global economy.

The origin of this study was rooted in a very practical problem, which was centred on why ERM implementation and practice appears to be successful in some organisations, and less successful in others. Answering this question explicitly requires measuring ERM on a variety of levels, and determining success factors of implementation and ERM's effect on the organisation, its people and its performance. As a first step, the researcher must thus define exactly what ERM is and how it can be measured. Unfortunately, such an ERM measurement instrument did not exist.

The literature review of this dissertation clearly confirmed the assessments of Kaplan (2011), McShane et al. (2011), Bromiley et al. (2015) and others, namely that there is indeed a significant gap in academic knowledge around the topic of ERM and more specifically, the measurement of ERM. It was concluded, that there is a need for a robust academically-validated instrument that will provide an enterprise risk management measurement scale comprising items and constructs that can act as variables for empirical studies. The main goal and contribution of this dissertation is exactly that, the development of a robust and empirically-tested ERMVS and its related constructs.

As was discussed in the methodology chapter, an extensive review of the organisational behaviour literature (e.g. Hinkin, 1998) highlighted a host of flaws in studies with regards to scale and construct development. These included inappropriate domain sampling, poor factor structure, low internal consistency and poor reporting of newly-developed measures – which ultimately combine to threaten academic understanding of organisational phenomena. There was a concerted effort made in this dissertation to avoid these mistakes in the development of the ERMVS and its related constructs.

To start at the beginning of the scale and construct development process, MacKenzie et al. (2011:329) recommended:

> *…because so many things depend on having a clear conceptual definition, this is one step in the process that should never be neglected in a scale validation study. More generally, we recommend focusing more attention on the front-end of the process – on providing a clear conceptual definition and developing indicators that adequately tap the concept domain and properly specifying the measurement model – than on cross-validating the scale and developing norms for it.*

This study took heed of those serious warnings and followed the recommendations of the seminal articles in the literature – in particular around emphasising the clear definition of the theoretical construct domain, a robust methodological design and reporting the findings as they are without presenting a "Little Jiffy" solution. The contributions of the study are detailed in Section 5.2.

5.2 THE CONTRIBUTIONS OF THE STUDY

The research problem of this dissertation is clearly centred on the development of an empirical measurement instrument for the ERM domain construct, based on primary data collection. It can be summed up by the question:

Can enterprise risk management values of emerging market risk managers be measured empirically in a valid and reliable manner by means of an item-based scale?

The focus of the dissertation was thus, more specifically, the development of an item-based ERM Values Scale (ERMVS) comprised of manifest variables that contribute to a latent variable ERM values construct structure. To be effective, this scale and the resulting constructs should be based on and integrate the broad canon of ERM academic and practice theory, and be empirically tested with an appropriate level of academic rigour. The instrument must demonstrate both reliability and validity and be utilised to empirically measure the resulting latent ERM construct(s) as well as enable further empirical refinement and cross-validation of the scale and constructs.

Referring back to the significant set of research questions detailed in Chapters 1 and 3, which are consolidated and presented in Table 5.1 below, these research questions have all been addressed within the discussion of the findings of this study. The findings form a significant part of the contribution of this dissertation. The main contributions of the study are related to the extension of the ERM body of knowledge in the form of augmenting the empirical measurement of ERM; these contributions are presented in Table 5.1. In determining whether ERM can be empirically measured, this study also contributes to the broader management science body of knowledge in the sense that if ERM can, in fact, be measured, it would also be possible to determine the role ERM plays in achievement of the objectives of the organisation, including increasing value.

From the outset, the literature has highlighted the importance of defining and demarcating a clear theoretical construct domain for developing an empirical measurement instrument. In the case of this study, no such definition had yet been completed in the ERM literature, and thus this study pioneers such an ERM construct domain definition. In fact, there were only three studies discovered, demonstrating a variety of methodological weaknesses, which previously even attempted to measure ERM with primary data. The contribution of this dissertation thus begins with the definition of the ERM domain construct to be measured. This was concluded through a comprehensive ERM literature review and critical analysis of issues in the ERM literature. In a novel contribution to this area of study, this review and analysis incorporated the broad canon of business and management sciences domains such as finance, accounting and organisational and strategic management, as well as practitioner and governance literature. The resulting ERM construct domain was thus defined within the nine pillars and an initial pool of 224 items, providing a contribution to ERM theory.

The main contribution of the study is focused around the development of a new, empirically-validated 23-item ERMVS, which resulted out of an ERM expert group review of the 224 items, and was taken through rigorous empirical reliability and validity testing including EFA and CFA. A new two-factor model of ERMVs was presented comprised of organic and mechanistic constructs.

In order to cross-validate the ERMVs constructs and test for an effect of culture, the ERMVs constructs were then examined for statistically significant relationships with culture dimensions. Several statistically significant relationships were found between the variables in a number of the cultural sub-groupings, and a number of additional contributions stemmed from this exercise. The replication and validation of the culture values instruments in this novel, specific sample provided a contribution around culture values in terms of emerging markets, and more specifically, a Southern African sub-groups context. Incorporating the testing of culture dimensions in a new sample and utilising cultural sub-groups enabled further culture dimension research extensions. This relates to a specific contribution of this study concerning the testing of an ERM nomological network, i.e. a network of interacting constructs that are theoretically related and affect each other.

The key contributions of the study, and details as to where in the dissertation the findings address the research questions that lead to the contributions, are summarised in Table 5.1 below.

Table 5.1: Summary of key contributions of the study

Key research questions	Addressed by	Key contributions of the study
How can a comprehensive theoretical construct domain of ERM values be clearly defined and demarcated? What is that demarcation of the theoretical ERM values domain construct?	The literature review (Chapter 2)	Comprehensive ERM literature review and critical analysis of issues in the ERM literature – incorporating the broad canon of business and management sciences domains such as finance, accounting and organisational and strategic management, as well as practitioner and governance literature. This extends the theoretical discourse around defining and measuring ERM and is novel in both its comprehensive nature and by combining the domains of academia, practice and governance to lead to the overarching theoretical construct domain definition.
What pool of items (manifest variables) can be developed to best reflect (and explain) the ERM values domain?	The pillars of ERM (Sections 2.5 and 4.2) The pool of ERM items (Appendix A)	Development of a new theoretical definition of the ERM construct domain, deeply rooted in the ERM body of literature, for empirical measurement, including (9) pillars for demarcation and critical success factor items (Initial pool of 224).
Do ERM experts confirm the content validity of the item pool i.e. what is the value of importance they assign to the items, and to what level do they agree on these values?	Expert group results (Section 4.2); ICC; Resulting 23-item ERMVS	Generation of a comprehensive item pool from the literature encompassing the ERM domain construct which was validated by an expert group
Within the specified domain construct, can a scale be developed (ERMVS), based on the item set of manifest variables that empirically measures the ERM values construct domain? Is this ERMVS valid and reliable? Is there systematic variation in ERM values across managers in samples of emerging market risk managers?	23-item ERMVS rigorously tested as per the results provided in Chapter 4	Development of a new, empirically-validated 23-item ERMVS
Does this ERMVS generate constructs (latent variables) that empirically measure ERM values of risk managers? If so, is there a single or are there multiple (sub-order) constructs that empirically measure ERM values in a reliable and valid manner? What do they represent? What is the explanatory power of the ERM construct(s) model measured by the ERMVS in terms of the defined ERM values	Results of the pre-study and main study i.e. EFA and CFA empirical analyses in Sections 4.4 and 4.5	ERMVS taken through rigorous empirical testing with presentation of robust results, including EFA and CFA, resulting in a new two-factor model comprised of organic and mechanistic constructs. If the ERMVS is valid and reliable, then it can be utilised to contribute to the broader management sciences – e.g. determine how ERM supports the objectives of the organisation including to increase its value.

construct domain?		

Table 5.1: Summary of key contributions of the study (continued)

Key research questions	Addressed by	Key contributions of the study
Are the national cultural values dimensions (independent variables) derived from the cultural values literature, i.e. Power Distance (PDI) and Uncertainty Avoidance (UAI), found to be valid and reliable in the sample selected for this study of emerging market risk managers? If so, is there systematic variation in specific cultural dimensions within the sample?	Results of the cross-validation Section 4.5.4	Replication and validation of the culture values instruments in this novel, specific sample; contribution in terms of emerging markets, Southern African sub-groups context and cross-validation with ERMVS.
Do the observed cultural values dimensions, as well as other demographic variables selected for cross-validation purposes, demonstrate a statistically-significant relationship with ERM values constructs in the selected samples of emerging market risk managers? Which cultural dimensions exhibit the most significant statistical relationship with ERM values constructs? Do the observed systematic construct relationships match those proposed in the theory of ERM and NC values (hypotheses) investigated in this dissertation?	Cross-validation results i.e. Tables 4.16, 4.17 and Appendix K	Demonstration of cross-validation of the ERMVs constructs with culture dimensions where several statistically significant relationships were determined; incorporating testing of culture dimensions in a new sample of emerging market / Southern African managers, utilising cultural sub-groups; enabling further culture dimension research extensions. This contributes to a cross-cultural, emerging markets and African dimension to ERM.

The methodology of the dissertation, as evidenced by the main results discussed in Chapter 4 and above, indicates critical thought and demonstrates application of judgement towards the critical primary quantitative evaluation criteria highlighted by authors such as Hinkin (1998), MacKenzie et al. (2011) and Morgado et al. (2017). In other words, the requisite methodologies provided by seminal works in the literature on the 'classical' scale and construct development were followed and documented within the dissertation, adding to the contribution of the study.

It should be noted, that the contribution of the study finishes with the presentation of the results of the empirical analysis and proposed future research directions. The next step in the scale development process, as outlined in both Churchill's (1979) original model for scale and construct development as well as MacKenzie et al.'s (2011) final step in the iterative process, is norm development, for which a new and different design and samples are required.

5.3 LIMITATIONS OF THE STUDY

Hinkin (1998:118) stated that "scale development clearly involves a bit of art as well as science. Anyone who has gone through a process similar to that described above will understand the difficulty of developing sound measures". This sentiment is echoed in terms of this dissertation. The study has several limitations, the most prominent being that it is primarily an exploratory study to develop and test a new measurement scale and the resultant constructs in ERM, a still-emerging field of the business and management sciences. As a result, it is likely that future research directions will evolve through time as more work is done on the ERMVS. This study thus makes a significant contribution to the body of work in the ERM domain, but is the first step on a journey. Taking this analogy further, there are many different paths which may be taken to develop the ERMVS further from this platform.

The dissertation presents the development of the ERMVS through a methodology where a comprehensive literature review (including practitioner contributions) is then followed by implementation of the business and management sciences paradigm of scale and construct development. Whilst having a considerable body of knowledge in the academic and practitioner literature spanning decades, ERM is still a relatively-new topic. The pool of items considered in the development of the scale and its refinement were rigorously tested through methods such as utilising an expert group and empirical processes including EFA and CFA throughout the course of the research; however, their generation required the active judgement of the researcher. Referring to Morgado et al. (2017), EFA in particular, is one of the tests that are most susceptible to subjectivity. All these empirical methods may be potentially improved on in future.

There are many different perspectives on both ERM and the measurement scale and construct development process represented in the literature that needed to be considered by the researcher. These include broad issues such as:

- How to best demarcate the ERM theoretical construct domain;
- How to provide expert content validity; and
- Dealing with nuances around specific technicalities in the reliability and validity testing, such as the rotation and loading of factors and interpretation of goodness of fit (GoF) in test procedures such EFA and CFA.

Whilst the two-factor ERM values construct structure ultimately provided a significant degree of explanatory power for a broad and comprehensive ERM values measure (which in turn demonstrated statistical significance as per the EFA and CFA testing), as well as reliability and validity, there is clearly further potential for refinement of the instrument.

For example, additional optimisation of the item pool and factor loading and structure, as well as cross-validation of the scale beyond the culture values dimensions that can still take place. The most obvious example is to utilise the ERMVS within a study of a broader management sample across a broader set of organisations – and one that includes management functions of the organisation beyond those typically associated with enterprise risk management. This speaks to the generalisability of the ERMVS and the findings of the study – all three of the samples of this study purposefully incorporated risk management professionals. Whilst this positively impacted development of the ERMVS in its conception, most specifically its content validity, future studies will need to incorporate a broader sample of management practitioners in order to increase the generalisability of the ERMVS and enhance its utility. Ultimately, the ERMVS will see its greatest value in a broader context in investigating phenomena within organisations.

Some technical limitations of the empirical scale and construct development methodology have been discussed in detail in the results chapter, for example around the ICC or GoF measures, and why some of the results may have reflected as they did. The ‘mechanistic’ and ‘organic’ classifications, whilst very promising and underpinned by a long history of theory in the business and management sciences were based on a resilient, but old, body of literature, and required interpretation by the researcher in terms of the classification matrix.

In the expert group process, many items were dropped from the initial pool of 102, which represented nine comprehensive ERM construct pillars. Referring to the discussions of formative vs. reflective indicators, in the modification indices stemming from the CFA of the two-factor model, there was potentially noise in the data with regards to relationships and directionality of the relationships between the variables and constructs. This could possibly be in part attributed to bias – a well-known phenomenon in studies collecting primary data. In a refinement, or norm development, of the two-factor model, besides dropping items, or directing the relationships

between variables, original items from the initial pool of 102 that demonstrate theoretical importance may contribute to explanatory power and the accuracy of the model. These could be re-introduced in further testing and sub-scale development within the nomological network.

As was discussed in the introduction, MacKenzie et al. (2011), in their seminal article on construct measurement and validation procedures, summarised the "life's work" aspect of construct development in the business and management sciences. They pointed towards Nunnally and Bernstein (1994: 87-88) who commented that "each scientist can only perform a relatively small number of major studies in a lifetime, which leaves insufficient time to do all that is required to specify the domain of a construct, develop measures of the construct, and relate these measures to other variables of interest". Having now reached the conclusion of this study, while its contribution is tangible and the findings documented, this limitation certainly applies to the work in this dissertation. Future research directions, including the promising areas for further development of the ERMVS are highlighted in the section which follows.

5.4 FUTURE RESEARCH DIRECTIONS

There are a number of interesting future research directions to pursue from this study. One of the most tangible future research directions is to embark on the next step of scale development for the ERMVS. As alluded to above, this includes the setting of norms by continuing with the empirical work around the CFA and SEM analysis of the data emanating from the two-factor ERMVS model. The modification indices for the two-factor ERMVS model were exhibited in Tables 4.14 and 4.15 and these show some clear opportunities from a statistical perspective to optimise the factor loadings – for example by "freeing" the covariances. Potentially the organic and mechanistic constructs could be developed independently, or as part of a greater nomological network. Determining direction between the variables and causality is an important topic to address. Asparouhov and Muthén (2009) discussed exploratory SEM as a mechanism for such studies, whereby EFA and CFA are incorporated in SEM to refine models with a variety of theoretical and statistical inputs. A strong warning here is that any changes made must have strong theoretical underpinnings. For example, an item which is found to statistically not load on one of the factors, should not just be dropped; there should be a theoretical explanation to such a decision and the relationships between variables considered, for example if they are formative or reflective. In future research efforts with the ERMVS, it will be important to ensure any modifications are driven by theory and empirical testing with an eye on the proposed design and sample of the future study.

In conjunction with above statistical analysis, the theoretical component of the mechanistic and organic aspects of the constructs and items can be further developed to explore nuances in the classification matrix. As Burns and Stalker (1961) indicated, organisations are not either organic or mechanistic, but exist on a continuum of this scale. Due to the importance of the pillars, such as

continual improvement, in the framework of ERM, the mechanistic and organic aspects of ERM very much warrant further investigation. For example, further theoretical analysis of the nine pillars of the ERM domain construct for appropriate items to re-include in the scale, and to determine which aspects of the nine pillars are organic or mechanistic.

Concerning content validity of the ERMV constructs, the results of the ICC tests of the expert group in this study showed a statistically significant, but low agreement between the judges of the items. It should be noted, that as alluded to above, ERM is a continuously evolving discipline, and key success factors could change or develop, and so in future, the item pool needs ongoing adjustment to remain relevant. For these reasons, it is important that future research will continue to utilise an expert group to refine and optimise the ERMVS item pool.

Another future research direction is to revisit the item pool with a view on not just optimising the current 23 ERMVS items, their wording etc., but perhaps including additional items back into the scale, for example based on the analysis of organic and mechanistic composition as proposed above. The drop from 102 to 23 items via the expert group testing was fairly significant, and done to provide a practical instrument. In hindsight, some important items to the scale may have been potentially inappropriately culled. Future ERMVS research could also incorporate additional technical nuances around item evaluation, for example, a mechanism whereby pairs of items are rated against each other to determine which scores higher, as well as reverse scored items to increase the diversity of the scale, and remove bias.

In selecting samples for future studies incorporating the ERMVS and testing hypotheses around the ERMVs constructs, researchers could select samples lending themselves to time series. According to MacKenzie et al. (2011), in order to determine the value of the ERMVS to business and management sciences theory (and also increase generalisability thereof), researchers could test the same respondents multiple times, over a period of a year, for example, to see if scores change systematically based on other moderators or influencers. This would promulgate significant findings in the domain of organisational behaviour, such as investigations into the effect of change management on ERM implementation.

Future research directions should certainly address additional aspects of criterion-related as well as predictive validity. Hypothesis testing is key to such evaluations. For example, samples could be purposefully selected and tested based on whether they are hypothesised to demonstrate high or low scores on the ERMVS and focal constructs. At this stage, the outcomes of endorsing one or the other ERMV factor are not known, and variables, such as firm performance, for example, need to be introduced with which to test these relationships. Further studies could be designed to test specific variables that can be manipulated and are hypothesised to exhibit a direct relationship with the ERMVs scores, such as calamitous events within the organisation. Predictors of risk taking in established in the decision sciences could also provide correlates for testing and norm development of the ERMVS. Testing scores on the ERMVS (stated values) against actual

observed behaviours also represents a promising direction for further research. Studies framed as such are experiments, whereby both values and behaviours are tested. They often provide valuable insights into how accurately values scales, such as the ERMVS, reflect actual behaviours related to the phenomenon or domain construct.

In the review of the ERM literature, it was evident that the majority of studies measuring ERM either relied on statistical analysis of secondary data (such as evidence of a CRO), or were qualitative investigations featuring case studies of organisations. If the methodologies of, for example, Florio and Leoni (2017) and Mikes (2009) or Woods (2009) were combined with the ERMVS in one study, this would represent a true triangulation for empirical testing of the ERM phenomenon. In this example, the secondary data of the firms could be tested in terms of the ERM Index developed by Florio & Leoni (2017), the managers in the firms would report ERMVS scores, and selected organisations would furthermore be subjected to the qualitative methodology (observation of actual behaviour) as expounded by Mikes (2009). Such a study would require a great amount of coordination, but would truly give a deep and valuable understanding of ERM values and practices in those organisations. This in turn, would ultimately contribute to the management sciences by providing insights into a potential means of enabling an organisation to achieve its objectives and improve organisational value.

To finally conclude, the ERMVS was rigorously tested with many empirical methods, and the findings are promising, in particular, explanatory power and factor structure of the model with its two constructs, and the clear path towards modification and refinement. Ultimately, these constructs can also act to help predict work attitudes and behaviours, which is a significant contribution to the business and management sciences from both an academic and practitioner standpoint. The main thrust of the future research directions from this study is to further expand this concept of developing a higher order, multi-dimensional construct to act as an ERM values scale. This will provide valid and reliable outputs for management sciences research and practice in a variety of domains and ultimately lead to ERM living up to its paradigm of a formalised risk management process. Namely that it supports organisations in achieving their objectives, providing both resilience and opportunity for organisations in the face of uncertainty.

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APPENDIX A:

FULL ERM ITEM POOL

Item no.	Final items mean	Included content validity	Source	ERM dimension	Item alias	Statement
1	3.50	X	Altuntas	EC	Risk Culture	The organisation develops a risk management culture that influences employees and stakeholders to consider risk information in their decisions
2	3.44	X	IRM	C&C	Escalation	The organisation has a clearly-defined chain of accountability and escalation for risk management issues
3	3.44	X	Arena	RA	Comprehensiveness	The organisation takes into consideration a comprehensive range of risks from all relevant categories, such as financial, operational and reputational
4	3.44	X	Gates - RR1	RA	Regular basis	Formal risk identification and assessment is conducted throughout the organisation on a regular basis
5	3.39	X	ISO	FD	Policy	The organisation's risk management policy clearly states objectives for, and commitment to, risk management
6	3.39	X	ISO	FD	Embedded	Risk management is embedded in the organisation's practices and processes in a way that is relevant, effective and efficient
7	3.39	X	Woods	FD	Tailored	The risk management framework is tailored to the type of organisation, its industry or sector, its architecture (i.e. functional areas and operating units) and processes
8	3.39	X	S&P	M&C	Governance	The organisation's governance structure reflects the influence of risk and risk management on decision-making across the organisation
9	3.39	X	Woods	RM&R	Action Plans	Action plans relating to risks and their treatment are distributed and assigned to individual owners in the organisation and systematically followed up on
10	3.33	X	IRM	C&C	Relationships	The risk management function of the organisation builds and sustains relationships across all areas of the organisation, including executive leadership
11	3.33	X	Altuntas	M&C	RM Authority	The organisation's risk management department / function exerts real authority derived from executive leadership

Item no.	Final items mean	Included content validity	Source	ERM dimension	Item alias	Statement
12	3.33	X	Gates - IE 1	M&C	Management communication	The organisation's leadership conveys the value proposition and benefits of risk management to employees
13	3.28	X	IRM	CI	Employees improving	In the organisation, all employees take responsibility for improving risk management
14	3.28	X	S&P	CI	Learnings	The organisation learns from experience and adjusts its risk management practices to improve its ability to measure and manage risk
15	3.28	X	Arena	EC	Understand roles	The organisation's risk management framework spans across the organisation, and employees have a clear understanding of their roles and responsibilities with regards to risk management
16	3.28	X	ISO	EC	Understand External	The organisation has an understanding of its external context, including the legal, regulatory, economic and competitive environment and the key drivers and trends impacting objectives and how they relate to risk management
17	3.28	X	Shenkir	FD	Framework Holistic	The risk management framework is holistic, taking a systemic view to integrate risk management within the organisation, countering the effects of silos (even possible silos of risk excellence such as the IT or insurance functions) in functions or operating units
18	3.28	X	Aon	M&C	Exec sponsor	The organisation has a visible risk management "sponsor" or "champion" in senior management
19	3.28	X	IRM	M&C	Direction	The organisation's leadership sets clear expectations and strategic direction for risk management
20	3.28	X	ISO	M&C	Exec endorsement	Senior management clearly defines and endorses the organisation's risk management policy
21	3.22	X	IRM	C&C	Quality	Quality risk information is demanded as part of the decision-making process within the organisation
22	3.22	X	Arena	FD	Integration	The organisation integrates ERM with other existing practices and processes such as strategic planning, budgeting and auditing
23	3.22	X	Gates - RR5	RT	BU Mitigation	The organisation develops and determines risk mitigation strategies within the business or operating unit level, closest to the risks

Item no.	Final items mean	Included content validity	Source	ERM dimension	Item alias	Statement
24		X	Altuntas	C&C	Accessibility	Resources and information on risk management are readily accessible to all employees, for example on the organisation's Intranet
25		X	Arena	C&C	Communication performance	The organisation regularly communicates with all stakeholders on risk management performance
26		X	IRM	C&C	Transparency	Transparency on risk information both positive and negative is rewarded within the organisation
27		X	IRM	C&C	Timeliness	Risk information is communicated timeously within the organisation
28		X	IRM	C&C	Forum	The organisation has an accessible forum for communication around risk issues
29		X	ISO	C&C	Internal Communication	Internal communication and reporting mechanisms support and encourage accountability and ownership of risk within the organisation
30		X	ISO	C&C	External Communication	External communication and reporting mechanisms engage appropriate external stakeholders, ensuring the organisation effectively exchanges risk information and provides clarity in risk disclosure
31		X	ISO	C&C	External confidence	The organisation utilises external communication of the organisation's risk management activities to build confidence in the organisation
32		X	Gates - IC 1	C&C	Language	There is an organisation-wide common language for communicating risks, risk management activities and monitoring efforts
33		X	Altuntas	CI	EA evaluation	The quality of the organisation's risk management process is regularly evaluated by external auditors or consultants with written assessments provided
34		X	Aon	CI	Human capital	The organisation incorporates risk management insights to develop its human capital processes and drive sustainable performance
35		X	Arena	CI	Performance reward	The organisation has a risk management performance process in place to identify and reward appropriate risk behaviour
36		X	IRM	CI	Insights	Insights on risk provided by employees are rewarded and encouraged in the organisation

Item no.	Final items mean	Included content validity	Source	ERM dimension	Item alias	Statement
37		X	IRM	CI	Whistleblower	The organisation has channels for confidential reporting of risk information i.e. "Whistleblower" hotlines
38		X	ISO	CI	Continual improvement	Based on results of monitoring and reviews, the organisation's risk management framework, policy and plan are continuously updated and improved
39		X	Woods	CI	IA evaluation	The quality of the organisation's risk management process is regularly evaluated by Internal Audit (IA) with written assessments provided
40		X	Woods	CI	Skills development	The risk management function is developing resources and skills to meet the organisation's objectives
41		X	Aon	EC	Value creation	The organisation intends to utilise risk management for value creation
42		X	Aon	EC	Stakeholders	The organisation considers a broad base of stakeholders such as customers and suppliers in establishing the context for risk management
43		X	COSO	EC	Understand objectives	Management and employees understand the organisation's risk management objectives and how they relate to and effect their job and tasks
44		X	ISO	EC	Risk model	The organisation has a common definition of the risk model used for assessing risks, including risk categories, definitions of probability (likelihood), impact (severity) and frequency
45		X	ISO	EC	Understand Internal	The organisation has an understanding of its internal context, including structure, roles, accountabilities and policies, objectives and strategies and how they relate to risk management
46		X	Paape	EC	Appetite decisions	A defined risk appetite is taken into account in conjunction with the organisation's objectives and decision-making processes
47		X	Paape	EC	Tolerance	The organisation explicates and/or quantifies risk tolerance, a measure that indicates excessively high or low risk in order to determine deviation from objectives and inform whether to take more or less risk
48		X	Paape	EC	Delegation	The accountability for identification, evaluation, assessment and management of risks lies with those employees in the organisation closest to the source of the risks

Item no.	Final items mean	Included content validity	Source	ERM dimension	Item alias	Statement
49		X	Woods	EC	Compliance	The organisation's risk management framework ensures compliance with legal and regulatory requirements
50		X	Altuntas	FD	Governance	The organisation utilises corporate governance issues, such as compliance to industry or listed-company codes, in developing the risk management framework design
51		X	Arena	FD	Framework Champion	The organisation utilises "risk champions" to carry the risk management framework into the operating units and functional areas to support achievement of objectives
52		X	ISO	FD	Resources	The organisation allocates appropriate resources for risk management by considering people, skills, experience and competence in following the processes for managing risk
53		X	ISO	FD	Process definition	The risk management policy, framework, processes and procedures of the organisation are clearly defined and documented in writing
54		X	ISO	FD	Timing	The organisation has an appropriate time plan for implementation of risk management
55		X	Shenkir	FD	Framework IA	The organisation's Internal Audit (IA) function is aligned with the risk management framework, giving input into the design of risk controls and/or auditing them
56		X	Altuntas	FM&R	Reporting Compliance	The organisation's ERM framework is regularly reviewed for compliance with new legal and regulatory requirements
57		X	Altuntas	FM&R	Reporting Committee	The organisation's risk committee meets regularly, reporting on progress of the organisation's risk management framework implementation
58		X	Altuntas	FM&R	Efficiency	The organisation regularly assesses the efficiency of the risk management process
59		X	IRM	FM&R	Boundaries	The organisation ensures boundaries set around the risk management framework i.e. following policies and procedures, are upheld
60		X	ISO	FM&R	Decision Making	Decision making in the organisation, including the development and setting of objectives, is aligned with the outcomes of the risk management process

Item no.	Final items mean	Included content validity	Source	ERM dimension	Item alias	Statement
61		X	ISO	FM&R	Periodic Review	The risk management framework, policy and plan are periodically reviewed for effectiveness and appropriateness given changes in the organisation's internal and external context
62		X	ISO	FM&R	Framework recording	To ensure traceability of its risk management activities, methods, tools and the overall risk management process are recorded and retained within the organisation
63		X	Paape	FM&R	EA	The organisation makes use of an external auditor or consultants to monitor and review the risk management framework
64		X	Gates - O1	FM&R	Written P&P	The organisation has established and regularly-updated written policy and procedure manuals that are consistent across major risks and the risk management framework
65		X	Woods	FM&R	IA	The organisation makes use of Internal Audit (IA) to monitor and review the risk management framework
66		X	Altuntas	M&C	Inspection Authority	The organisation's risk management department / function has the authority to inspect other departments and challenge risk information
67		X	ISO	M&C	Resources	The organisation allocates significant time/resources for risk management training or skills building
68		X	ISO	M&C	Performance indicators	The organisation incorporates risk management performance indicators in its overall performance indicators (i.e. KPIs)
69		X	S&P	M&C	Independent function	The organisation has an ERM function independent of profit centres, reporting directly to senior management
70		X	Shenkir	M&C	Risk budgeting	The organisation's planning, budgeting and capital allocation processes take into consideration risks and their treatment
71		X	Gates - IE2	M&C	Job description	The organisation incorporates accountability and responsibility for risk management into the job description of all managers
72		X	Woods	M&C	Training	Structured risk management training or risk management programmes are provided to the organisation's employees
73		X	Altuntas	RA	Assessment methods	The organisation utilises methods such as workshops, surveys, group discussions etc. to identify and assess risk

Item no.	Final items mean	Included content validity	Source	ERM dimension	Item alias	Statement
74		X	Altuntas	RA	Media risks	The organisation actively screens the media, including social media, for potential risks
75		X	Arena	RA	Evaluation method	The organisation evaluates risks using both qualitative (Rating scales, risk prioritisation, Heat Maps) and quantitative techniques (simulation, Monte Carlo analysis, Value At Risk)
76		X	Arena	RA	Overarching metric	The organisation ties risk quantification throughout the organisation to a common matrix or metric such as the capital budget or revenues
77		X	IRM	RA	Staff training	The organisation's employees are trained in utilising the risk assessment tools and outputs appropriate for their role in risk assessment
78		X	ISO	RA	Risk criteria	The organisation defines clear criteria reflecting the organisation's values, objectives and resources to evaluate the significance, nature and level of risk (i.e. a risk model, risk appetite definition)
79		X	Fraser	RA	Shared risks	Different functions in the organisation, such as marketing and technical, are cognisant that they share some key risks, for example product quality
80		X	Power	RA	Systemic risk	The organisation takes into account combinations of multiple risks and interdependencies of risks, the effect of which could be compounded or cumulative (systemic risk)
81		X	Gates - RR3	RA	Quantification	The organisation quantifies its key risks to the best extent possible
82		X	Altuntas	RM&R	Relevance data	The organisation examines the relevance and quality of data collected and utilised in the risk management process
83		X	Arena	RM&R	Prospective	The organisation utilises risk management analysis proactively for planning future actions such as budgeting and investment decisions
84		X	Arena	RM&R	KPIs	Key Performance Indicators (KPIs) are utilised throughout the organisation for measuring the risk-based performance of those accountable for specific risks
85		X	Arena	RM&R	Framework compensation	The organisation's management compensation is linked to risk management performance measures

Item no.	Final items mean	Included content validity	Source	ERM dimension	Item alias	Statement
86		X	IRM	RM&R	Outcomes challenged	The outputs of the risk management process are challenged within the organisation for example by stress testing or analysis of losses
87		X	Mikes	RM&R	Framework analysis	The organisation's risk monitoring and review process ensures that analysis and lessons learned from risk events such as near misses, losses and successes are incorporated in the risk management process
88		X	Mikes	RM&R	Framework KRIs	The organisation utilises Key Risk Indicators (KRIs), forward trend measurements, to monitor and report on risks
89		X	S&P	RM&R	Regular updates	Each area of the organisation is aware of and regularly updates and reviews the register of its top risks
90		X	Gates - P1	RM&R	Risk adjusted performance	Risk management allows the organisation to measure risk-adjusted performance among different operating / business units
91		X	Woods	RM&R	Framework IA	The organisation's audit committee / Internal Audit (IA) function is an integral part of the risk management process and linked to it to provide assessments
92		X	Woods	RM&R	RMIS SW	The organisation utilises a Risk Management Information System or similar IT system or Software (SW) to review and monitor risks and risk treatment in a comprehensive, structured and systematic way, providing a central repository from which to generate action plans and reports
93		X	Altuntas	RT	Treatment capital	Capital and/or budget is allocated to areas of the business based on successful outcomes of the risk treatment process
94		X	Aon	RT	Upside risk	The organisation's treatment of risk develops from focusing on risk avoidance and mitigation to leveraging risk and risk management options that extract value and focus on reward / upside
95		X	ISO	RT	Treatment Plans	Risk treatment plans of the organisation clearly document the implementation of treatment options including the reason for selection of the option and expected benefit to be gained
96		X	ISO	RT	Treatment accountability	Risk treatment plans of the organisation clearly document the individuals accountable for approving the plan, those responsible for implementing the plan and the expected outcome

Item no.	Final items mean	Included content validity	Source	ERM dimension	Item alias	Statement
97		X	King	RT	Mitigation writing	The organisation captures decided upon risk responses, treatments, mitigation actions and accountability in a risk register
98		X	King	RT	Treatment upside	Risk treatment also considers the identification and exploitation of opportunities for the organisation (opportunity or upside of risk)
99		X	King	RT	Black swans	The organisation scans its environment to plan in anticipation of emerging risks that could affect it in the future, and prepares for unpredictable, low likelihood/high impact risks - so-called "Black Swans" events (Risk resilience)
100		X	Purdy	RT	Mitigation	In mitigating risks, the organisation consciously pursues a variety of options, including avoiding, accepting, reducing or transferring risks
101		X	S&P	RT	Terminate risk	Risk controls are consistent with the the organisation's risk tolerances, and the risk treatment process ensures that if a risk is beyond the established risk appetite it is terminated or not taken
102		X	Power	RT	Framework BCP	The organisation's Business Continuity Planning (BCP) and/or Disaster Management (DM) is aligned with the risk management and risk mitigation process in preparation for crisis and unknown, emerging risks
103			Aon	C&C	Communication transparency	Communication regarding risk management must be transparent throughout the organisation
104			Arena	C&C	Ownership	Ownership of the risk management process is integrated, engaging people and systems across the organisation in a coordinated manner and promoting communication between risk specialists and the risk owners
105			Shenkir	C&C	External stakeholders	The organisation encourages open, bilateral communication with external stakeholders on risk
106			IRM	C&C	Expectations	Employees throughout the organisation are clear on what is expected to them in terms of risk management
107			IRM	C&C	Active discussion	Risk management issues are actively discussed in the organisation, for example between colleagues
108			IRM	C&C	Consistent delivery	Risk management messages are consistently delivered within the organisation

Item no.	Final items mean	Included content validity	Source	ERM dimension	Item alias	Statement
109			IRM	C&C	Speed communication	Leadership actively encourages information related to risk to travel quickly across the organisation
110			IRM	C&C	Format	Risk information is presented in a useful format that can be acted on within the organisation
111			IRM	C&C	Provide Direction	Direction is provided in the organisation as to how risk management contributes to the business objectives
112			ISO	C&C	Internal reporting	Internal reporting on the risk management framework, its effectiveness and the outcomes, is communicated appropriately upstream, downstream and across the organisation
113			ISO	C&C	Stakeholder Communication	The organisation clearly communicates its expectations for risk-taking (Risk Appetite) to appropriate stakeholders
114			ISO	C&C	Info & Training Sessions	The organisation conducts information and training sessions on risk management
115			ISO	C&C	External Governance	The organisation ensures external risk management communication and reporting mechanisms ensure compliance with legal, regulatory and governance requirements
116			ISO	C&C	Consultative stakeholdrs	The organisation adopts a consultative approach with regards to the risk management process, understanding and considering the interests of stakeholders
117			ISO	C&C	Consultative differences	A consultative approach with regards to the risk management process is utilised within the organisation, taking into consideration different areas of expertise and different views on risk
118			ISO	C&C	Internal Decisions	Internal communication and consultation takes place within the organisation, so that those responsible within for implementing the risk management process understand the basis on which decisions are made and why particular actions are required
119			ISO	C&C	External Decisions	External communication and consultation on risk management takes place so that the organisation's stakeholders (such as customers and suppliers) understand the basis on which decisions are made and why particular actions are required

Item no.	Final items mean	Included content validity	Source	ERM dimension	Item alias	Statement
120			ISO	C&C	Communication stakeholders	The organisation communicates the benefits of the risk management process to all stakeholders
121			King	C&C	Stakeholder disclosure	The organisation ensures complete, timely, relevant, accurate and accessible disclosure of risk to stakeholders
122			Paape	C&C	Report Frequency Internal	The organisation reports on risk to internal constituencies (stakeholders) 1=Never; 2=Ad Hoc; 3=Yearly; 4=Quarterly; 5=Monthly; 6= Weekly
123			Paape	C&C	Report Frequency External	The organisation reports on risk to external constituencies (stakeholders) 1=Never; 2=Ad Hoc; 3=Yearly; 4=Quarterly; 5=Monthly; 6= Weekly
124			Gates - IC 2	C&C	Board Informed	The Board and executive leadership of the organisation are regularly briefed on risk management issues
125			Gates- M3	C&C	Improved communication	Conducting formal, comprehensive risk management (ERM) improves an organisation's ability to communicate risk taking to the board and external stakeholders
126			Gates - OS3	C&C	Communicated risk appetite	The organisation clearly communicates expectations and willingness for risk-taking to its employees (Risk Appetite)
127			Gates - OS3	C&C	Communication Senior	The organisation should clearly communicate its expectations for risk-taking to senior managers
128			Altuntas	CI	RMIS Improvement	A Risk Management Information System (RMIS) or similar IT infrastructure and/or software (SW) is utilised to embed risk management into the organisation
129			Altuntas	CI	Suggestions opportunity	Employees have the opportunity to make suggestions for improvement regarding risk management in the organisation
130			Altuntas	CI	Suggestions improvement	Suggestions from employees are considered by leadership to improve risk management in the organisation
131			IRM	CI	Bad news	The organisation's leaders encourage 'Bad News' risk information to be communicated up the management chain

Item no.	Final items mean	Included content validity	Source	ERM dimension	Item alias	Statement
132			IRM	CI	Awareness	Risk awareness is recognised as a key competency within the organisation and is incorporated within employee criteria
133			ISO	CI	External feedback	External communication and reporting is utilised to elicit feedback on the organisation's implementation of risk management
134			ISO	CI	Ongoing Assessment	Risk assessment, treatment, monitoring and review occur on an ongoing basis within the organisation, leading to continual improvement
135			King	CI	Mgt Briefings	Management of the organisation receives regular briefings on changes in risks, laws and the environment to improve the risk management framework
136			King	CI	IA Assessments	Internal Audit provides written assessments of the organisation's risk management system
137			S&P	CI	Committed culture	A culture that demonstrates commitment to risk management permeates all levels of the organisation, with senior management taking the lead
138			King	CI	Sustainability	The organisation incorporates risk management into its sustainability process
139			McShane	CI	Risk Discussion	Employees have the opportunity to discuss risk issues with colleagues responsible for the risk management function
140			McShane	CI	Policy Behaviour	Employees look to the organisation's risk policy as part of everyday behaviour
141			Gates - P3	CI	Volatility	The organisation utilises risk management to improve earnings volatility over time
142			Gates - P4	CI	Profitability	The organisation utilises risk management to improve profitability over time
143			Altuntas	EC	Risk Decision	The organisation's employees consider risks in their decisions
144			Aon	EC	Risk Information	The organisation focuses on risk information in the decision-making processes

Item no.	Final items mean	Included content validity	Source	ERM dimension	Item alias	Statement
145			Arena	EC	Corporate view	Managers benefit from overall risk management analysis throughout the organisation and understand how risks in their areas relate to corporate strategy
146			S&P	EC	Management Compensation	The organisation's management and compensation is influenced by risk management
147			S&P	EC	Transparent Philosophy	The risk management philosophy is transparent across the organisation
148			Gates - ID1	EC	Risk Register	The organisation has established a comprehensive register of risks to be managed
149			Gates - ID2	EC	Workshops	Methods such as workshops and surveys are utilised to identify and map risks across the organisation
150			Gates - OS2	EC	Defined appetite	Clear tolerance levels or limits for all major risk categories are established across the organisation (Risk Appetite)
151			Gates - RR4	EC	Holism	The organisation has a process to integrate the effects of major risk types (i.e. strategic, operational, financial, hazard and legal)
152			Gates - RR5	EC	BU Level	The organisation's business / operational units identify and determine treatment strategies for risks as they are closest to the risks
153			Woods	EC	Methodologies	The organisation's risk model and risk assessment methodologies are clearly defined and communicated
154			Altuntas	FD	ERM function	The organisation has a separate / independent risk management department or function
155			Aon	FD	HC Process	The organisation's human capital process is integrated with risk management
156			Arena	FD	Localisation	The organisation addresses risks in a coordinated manner and aggregates them holistically, breaking the silo effect and localising risk classification
157			Arena	FD	Reporting function	The head of risk management in the organsation reports to finance

Item no.	Final items mean	Included content validity	Source	ERM dimension	Item alias	Statement
158			Hoyt	FD	Framework CRO	The organisation has a Chief Risk Officer (CRO) or senior manager dedicating an appropriate amount of time to risk management
159			ISO	FD	Accountability	The organisation ensures there is accountability, authority and appropriate competence for managing risk by facilitating individual responsibility and performance targets within job descriptions at all levels
160			ISO	FD	Process applied	The risk management policy and process are applied consistently throughout the organisation's functional areas and operating units
161			King	FD	Risk committee	The organisation has a risk committee that meets regularly to address risk management issues
162			Paape	FD	Retrospective Reporting	The organisation reports on retrospective (historical) risk issues such as general information on risks, the status of risk control activities, critical risk control indicators and incidents
163			Paape	FD	Prospective Reporting	The organisation reports on prospective (future) risk issues such as developments in the risk profile, significant internal changes, significant external changes and risk control improvements
164			Woods	FD	RMIS	A Risk Management Information System (RMIS) and/or other IT tools and Software are utilised to manage and report on information under the organisation's risk management framework
165			Arena	FM&R	Landscape Evaluation	Aspects of evaluating the ERM landscape – (1) Model and linkage to existing practices i.e. corporate governance, compliance, performance 92) Players (3) Technology i.e. ERM framework or process
166			ISO	FM&R	Reporting KPIs	Risk management performance indicators are regularly aligned with the performance indicators and values of the organisation
167			ISO	FM&R	Follow Framework	The organisation periodically reports on progress with the risk management plan and how well the risk management policy is being followed
168			King	FM&R	Compliance	The organisation's risk management framework is regularly updated to ensure legal and regulatory compliance

Item no.	Final items mean	Included content validity	Source	ERM dimension	Item alias	Statement
169			Gates- O2	FM&R	Monitor & Review	The risk management framework of the organisation is regularly and periodically monitored and reviewed by senior management
170			Gates - O3	FM&R	Reporting Metrics	The organisation has identified the key metrics required for reporting on risk management performance
171			Altuntas	M&C	Employee familiarity	The organisation's risk management policy, risk management framework and risk concepts have been communicated to employees to the point that they are familiar with them
172			Altuntas	M&C	Risk culture	The organisation's leadership specifically addresses the issue of risk management culture
173			Altuntas	M&C	Risk influence	The risk management function exerts an influence within the organisation
174			Aon	M&C	Board & Exec	The organisation's board and executive pay attention to risk management
175			COSO	M&C	Exec tone	The board and executive management set the organisation's tone and culture for risk management
176			IRM	M&C	Risk support	The organisation's leaders are supportive of those employees actively seeking to understand and manage risk issues
177			IRM	M&C	Embed risk culture	The organistion actively embeds a risk management culture aligned with the risk management policy
178			S&P	M&C	Strategic planning	Risk management is integrated into the organisation's core strategic planning process
179			Shenkir	M&C	Strategic objectives	The organisation has communicated clearly defined strategic objectives throughout the organisation, to which the risk management framework is aligned
180			Shenkir	M&C	RM focus objectives	The risk management framework influences the organisation to identify and focus on its objectives at all levels
181			McShane	M&C	Management Direction	Management of the organisation provides a clear sense of direction in relation to risk management

Item no.	Final items mean	Included content validity	Source	ERM dimension	Item alias	Statement
182			Gates - IE 3	M&C	Exec visibility	The organisation's leadership is visibly involved in the risk management process
183			Gates - OS 1	M&C	Risk and objectives	The organisation aligns its business risks with its goals and objectives
184			Altuntas	RA	Aggregation	The organisation aggregates risks into an overall risk assessment model for example through risk management software
185			Altuntas	RA	Interdependencies	In the risk assessment methodology, the organisation takes into account interdependencies of risks throughout the organisation
186			Aon	RA	Quantification	The organisation's objective, measurable risks are quantified in financial terms
187			Aon	RA	Analysis & Evaluation	Risk analysis and evaluation is utilised by the organisation to understand risk and demonstrate the value of risk management
188			COSO	RA	Appetite assess	The organisation assesses risk within clearly defined levels at which risk is acceptable or tolerable (risk appetite)
189			IRM	RA	Decision template	The organisation has a clear decision template for assessing risk
190			ISO	RA	Objective subjective	In risk assessment, the organisation considers both objective, measurable risk in combination with subjective, perceived risk
191			Mikes	RA	Interrelationship	The organisation's risk management framework takes into account the relationships between risks such as interdependence of risks
192			Power	RA	Risk modeling	The organisation models risks as they emerge for example through scenario analysis and decision trees
193			Paape	RA	Assessment frequency	The organisation conducts risk identification and assessment at regular intervals
194			Paape	RA	Assessment Level	The organisation conducts risk identification / assessment at various levels including senior management
195			Paape	RA	Quantitative Methods	The organisation quantifies risk with one or more of the following techniques: scenario analysis, sensitivity analysis, simulation, stress testing

Item no.	Final items mean	Included content validity	Source	ERM dimension	Item alias	Statement
196			Gates - RR2	RA	Root cause	The organisation formally analyses the root cause, impact and interrelationships of its risks
197			Aon	RM&R	Formal data collection	Formal collection and incorporation of operational and financial risk information into decision-making processes
198			Arena	RM&R	Report detail	Risk reports generated by the organisation include a detailed analysis of the risk management results
199			Arena	RM&R	IA	The organisation's Internal Audit (IA) function takes into consideration inputs from the risk management process in the planning of audit activities
200			IRM	RM&R	Threshholds	The organisation sets thresholds or trigger points at which to act on risk or opportunity
201			IRM	RM&R	Risks challenged	The organisation has an independent risk function that communicates and challenges risk information
202			IRM	RM&R	Individual accountability	All employees within the organisation are accountable for management of risk
203			IRM	RM&R	Employee decisions	The organisation's employees consider risks in their decision-making process
204			IRM	RM&R	RMIS	The organisation utilises a Risk Management Information System (RMIS), a software platform that captures risk registers, risk models etc., to coordinate risk management
205			ISO	RM&R	Updated risks	The organisation's risk monitoring and review process ensures that new, current information (e.g. changes in internal and external context), as well as identification of emerging risks, is integrated and continually improves risk assessment and treatment
206			King	RM&R	No Delegation	The accountability for identification, evaluation, assessment and management of risks within the organisation lies primarily with senior management
207			King	RM&R	Implementation distribution	Senior management of the organisation should be more accountable for risk management than the employees

Item no.	Final items mean	Included content validity	Source	ERM dimension	Item alias	Statement
208			King	RM&R	Board and exec accountability	The board and senior executives of the organisation should take the primary accountability for management of risk
209			King	RM&R	Function Authority	The organisation's risk management function (also via Internal Audit) has the authority to inspect other departments
210			S&P	RM&R	Risk controls	The organisation applies risk controls which effectively deliver the necessary effect on exposure and losses, clearly stating the control activity and owner
211			S&P	RM&R	Control testing	Risk controls are subject to metrics, stress-testing, validation or performance measurement
212			S&P	RM&R	Emerging risks	The organisation addresses emerging risks that could affect it in the future as a result of a changing environment such as government and regulation, the public, the environment etc.
213			S&P	RM&R	Environment Scan	The organisation scans the environment to anticipate and prepare for emerging risks
214			S&P	RM&R	Tolerance Analysis	The organisation identifies, analyses and keeps losses within the defined risk tolerance
215			S&P	RM&R	Models	The organisation utilises effective models which realistically provide insight into possible risks and support the risk management process
216			Gates - O2	RM&R	BU M&R	The organisation's business /operating units monitor and report on current status of managing key risks
217			ISO	RT	Treatment cycle	Risk treatment involves a cyclical process of assessing and generating risk treatments, deciding whether residual risk levels are tolerable, and assessing the effectiveness of those treatments
218			ISO	RT	Treatment stakeholders	Selecting the most appropriate risk treatment options, whether individually or in combination, the organisation considers the values and perceptions of various stakeholders
219			ISO	RT	Treatment monitoring	The organisation monitors risk treatments as an integral part of risk management to ensure that measures are met and remain effective

Item no.	Final items mean	Included content validity	Source	ERM dimension	Item alias	Statement
220			ISO	RT	Treatment Sustainability	When selecting risk treatment options, the organisation considers their costs and efforts of implementation against the benefits derived in terms of Sustainability (Social, Environmental & Economic)
221			ISO	RT	Treatment Residual	Decision makers and stakeholders are made aware of the nature and extent of the risk remaining after treatment (Residual risk)
222			S&P	RT	Data trends	The organisation analyses data trends, such as arising from losses, to improve the risk treatment process
223			S&P	RT	Similar risks	Similar risk types are treated in a coordinated and consistent manner across business units, functions and geographic locations
224			Shenkir	RT	Treatment appetite	The concept of risk appetite, the overall level of risk that the organisation is willing to accept given its capabilities and stakeholder expectations, is clearly addressed and communicated in the organisation's risk treatment process

List of sources used in Full ERM item pool	
Altuntas	Altuntas, M., Berry-Stölzle, T.R. & Hoyt, R.E. (2011). Implementation of enterprise risk management: Evidence from the German property-liability insurance industry. *The Geneva papers on risk and insurance – issues and practice*, **36**(3), 414-439.
Aon	Aon. (2015). *Global risk management survey 2015.* [Online] Available: www.aon.com/forms/2015/2015-global-risk-management-survey.jsp Accessed: date. 24 April 2016
Arena	Arena, M., Arnaboldi, M. & Azzone, G. (2010). The organizational dynamics of enterprise risk management. *Accounting, organizations and society*, **35**(7), 659-675.
COSO	Committee of Sponsoring Organizations of the Treadway Commission (COSO). (2004). *Enterprise risk management – integrated framework*. [Online] Available: https://www.coso.org/Documents/COSO-ERM-Executive-Summary.pdf Accessed: 24 April 2016.
Fraser	Fraser, J. & Simkins, B. (2010). *Enterprise risk management: today's leading research and best practices for tomorrow's executives*. Hoboken, New Jersey, USA: John Wiley & Sons.
Gates	Gates, S., Nicolas, J. & Walker, P.L. (2012). Enterprise risk management: a process for enhanced management and improved performance. *Management accounting quarterly*, **13**(3), 28-38.
Hoyt	Hoyt, R.E. & Liebenberg, A.P. (2011). The value of enterprise risk management. *Journal of risk and insurance*, **78**(4), 795-822.
IRM	The Institute of Risk Management (IRM). (2012). *Risk culture: resources for practitioners.* United Kingdom.
ISO	International Standards Organization (ISO). (2009). *31000: 2009 Risk management – principles and guidelines*. International Organization for Standardization, Geneva, Switzerland.
King	King, M.E. (2009). *King report III on governance for South Africa*. King committee on corporate governance. Institute of Directors, Southern Africa.
McShane	McShane, M.K., Nair, A. & Rustambekov, E. (2011). Does enterprise risk management increase firm value? *Journal of accounting, auditing & finance*, **26**(4), 641-658.
Mikes	Mikes, A. (2011). From counting risk to making risk count: boundary-work in risk management. *Accounting, organizations and society*, **36**(4), 226-245.
Paape	Paape, L. & Speklé, R.F. (2012). The adoption and design of enterprise risk management practices: an empirical study. *European accounting review*, **21**(3), 533-564.
Power	Power, M. (2009). The risk management of nothing. *Accounting, organizations and society*, **34**(6), 849-855.
Purdy	Purdy, G. (2010). ISO 31000: 2009 setting a new standard for risk management. *Risk analysis*, **30**(6), 881-886.
Shenkir	Shenkir, W.G., Barton, T.L. & Walker, P.L. (2010). Enterprise risk management: lessons from the field. In Fraser, J. & Simkins, B.J. (eds.), *Enterprise risk management – today's leading research and best practices for tomorrow's executives*, Chapter 24, 441-463. Hoboken, NJ, USA: John Wiley & Sons.
S&P	Standard & Poor's (S&P). (2007). *Industry report card: enterprise risk management can help US commercial lines insurers ward off irrational pricing*, 30 April.
Woods	Woods, M. (2009). A contingency theory perspective on the risk management control system within Birmingham city council. *Management accounting research*, **20**(1), 69-81.

APPENDIX B:

FEEDBACK FROM THE EXPERT GROUP

Content validity	Survey instrument
At least one board member needs to be responsible for this area. Awareness of both civil and criminal consequences of failure to adequately address risk management issues. Lifetime training of Board members should also include risk management issues. This is not just an issue for senior management.	It's very hard to assign relative values - all of these things are important. Perhaps it might help to think in terms of maturity or what should be done first.
Senior management giving the correct example of how to behave in relation to risks/risk management	A large number of questions (too much?)
Need to break the "glass ceiling" between management and the board. Imperative to have meaningful Board commitment.	Time did not allow for a critique of whether the dimensions and their items were totally sufficient.
Comment: "...risks lies with those employees in the organisation closest to the source of the risks". I feel risk lies with all employees irrespective of rank and position. All employees need to understand and appreciate their role to reduce risk during planning, execution and business operations, be it strategic or functional lines.	Some of the items overlap, for example there are two consecutive items on risk management training which appear relatively similar
Consider information sharing (where not of a competitive nature) in industry organisations, and also in Risk Management organisations. Need for bench marking.	
Rather mitigate contributing factors for a risk than risk itself	
Establishing an organisation's true 'risk tolerance' is a huge milestone as it sets the base upon which risk performance of an organisation can be actively managed. Get this wrong, and the organisation may fail because its risk tolerance has been exceeded and the resources available to recover may not be sufficient. The business continuity management (BCM) plan needs to clearly define resources (inhouse, local, regional, national and international).	
Quality of risk resources and enthusiasm is a requirement for ensuring that risk management is embedded in the organisation.	
KRIs are the only true way to test risk management performance within an organisation as well from unit to unit. If you have KRIs that impact the 'pocket' you will receive the attention. If not, it is just another task that management will get to when resources allow. KRIs result in a sense of ownership which is a cornerstone of a successful RMS.	
Training of staff to use risk tools is very important. I maintain, no one knows the risks better than those who perform the job every day, therefore employees who understand and can use the risk tools will provide maximum value to the organisation. Failure to upskill employees in terms of risk management is a recipe for an unsuccessful RMS.	

Content Validity	Survey Instrument
A well-documented RMS will go a long way to ensure a uniform and consistent application of the risk methodologies, tools and procedures. Employees come and go and therefore a well-documented ERM will be the point of call to ensure ERM objectives are met through proper risk management practices.	
Continual improvement needs to be measured in such a way that the employees and the organisation as whole understands that efforts made year on year reduce risks effectively. An important issue to acknowledge is that some risks will remain high, however mitigatory measures need to be intensified at those nodal points to ensure the risk tolerance level is maintained. Mitigatory measures should, at least, be preventative (procedures, training, signage), monitor and measure (financial performance monitoring, operational monitoring) and emergency preparedness and response (emergency plan, BCM plan, disaster management plan (DMP)).	

APPENDIX C:

EXPERT GROUP CONTENT VALIDITY SURVEY

UNIVERSITEIT STELLENBOSCH UNIVERSITY

Content Validation of Enterprise Risk Management Dimensions and Items

*This survey forms part of a PhD research project at the **University of Stellenbosch Business School (USB)** in South Africa investigating the effect of culture on **Enterprise Risk Management (ERM)** attitudes and behaviour.*

*This survey is being sent to risk management experts like you to assist in validating items measuring various components and aspects of an Enterprise Risk Management framework. These items can be viewed as measuring **ERM key success factors**, or indicators of ERM maturity. One expected outcome of the PhD research is the development of an ERM maturity index, which will assist organisations in assessing key success factors of ERM.*

*Key components of an **ERM framework**, recognisable from widely utilised standards such as COSO or ISO 31000, for example "Mandate & Commitment," "Risk Assessment" and "Monitoring & Reporting" have been labeled as "**dimensions**" in this survey. The individual questions / components that comprise each dimension are labeled **"items."***

*Please score the items within each dimension on a scale of 1 to 4 (Less Important - Moderately Important - Very Important - Of Most Importance) as to how important you feel the items are to successful implementation of ERM **in the context of the other items in that dimension**. In other words how important is each item in measuring the dimension in question, in relation to the other items. **Each item should be scored.***

*Please keep in mind, that most of these items will affect the specific dimension and ERM implementation as a whole. One objective of the survey is to **solicit expert opinion** in **differentiating between the items** and their relative importance. For this purpose it might assist to complete each item quickly with the first response that comes to mind. Please answer from **your personal perspective as a risk expert** <u>not</u> from the perspective of your organisation.*

As a second element of the survey, please propose additional items for each dimension you believe are relevant to the dimension that have not been addressed in the available pool of items.

Finally, please indicate any additional dimensions you believe are important for a successful ERM framework or implementation that have not been included in this survey questionnaire.

The survey is expected to take approximately 20 minutes. There are 9 ERM dimensions in total.

If you are interested in receiving anonymous results from this research, or additional information on ERM, please indicate your email address in the space provided at the end of the questionnaire.

Thank you very much for your participation!

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Mandate & Commitment (M&C)

This dimension of ERM measures the mandate and sustained commitment demonstrated by management of the organisation to introduce and ensure continued effectiveness of risk management. It addresses how management sets the tone for committment to risk management in the organisation by means of alignment with strategic objectives, assigning risk mangement accountability, responsibility and performance measurement, and ensuring the necessary resources are available for risk management.

* **Mandate & Commitment**

For each of the following items, please indicate their **relative** importance to the above dimension of ERM **in the context of the other items in the pool.** Each item should be scored.

	Less Important	Moderately Important	Very Important	Of Most Importance
The organisation's leadership conveys the value proposition and benefits of risk management to employees	☐	☐	☐	☐
The organisation incorporates accountability and responsibility for risk management into the job description of all managers	☐	☐	☐	☐
Senior management clearly defines and endorses the organisation's risk management policy	☐	☐	☐	☐
The organisation incorporates risk management performance indicators in its overall performance indicators (i.e. KPIs)	☐	☐	☐	☐
The organisation has an ERM function independent of profit centres, reporting directly to senior management	☐	☐	☐	☐
The organisation allocates significant time/resources for risk management training or skills building	☐	☐	☐	☐
Structured risk management training or risk management programmes are provided to the organisation's employees	☐	☐	☐	☐
The organisation's risk management department / function exerts real authority derived from executive leadership	☐	☐	☐	☐
The organisation's risk management department / function has the authority to inspect other departments and challenge risk information	☐	☐	☐	☐
The organisation's planning, budgeting and capital allocation processes take into consideration risks and their treatment	☐	☐	☐	☐
The organisation has a visible risk management "sponsor" or "champion" in senior managment	☐	☐	☐	☐
The organisation's governance structure reflects the influence of risk and risk management on decison-making accross the organisation	☐	☐	☐	☐
The organisation's leadership sets clear expectations and strategic direction for risk management	☐	☐	☐	☐

Are there any additional items or components relevant to this dimension that you believe should be included for the measurement of this dimension?

Any comments on this dimension?

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Framework Design (FD)

This dimension of ERM measures the design and establishment of the risk management framework within the organisation. Important components comprised in risk management framework design include establishing the risk management policy, ensuring accountability, authority, competency and controls for risk management throughout the organisation, effective and efficient integration of risk management into organisational processes and allocation of appropriate resources for risk management.

* **Framework Design**

For each of the following items, please indicate their **relative** importance to the above dimension of ERM **in the context of the other items in the pool.** Each item should be scored.

	Less Important	Moderately Important	Very Important	* Of Most Importance
The risk management policy, framework, processes and procedures of the organisation are clearly defined and documented in writing	☐	☐	☐	☐
The organisation's risk management policy clearly states objectives for, and commitment to, risk management	☐	☐	☐	☐
Risk management is embedded in the organisation's practices and processes in a way that is relevant, effective and efficient	☐	☐	☐	☐
The organisation allocates appropriate resources for risk management by considering people, skills, experience and competance in following the processes for managing risk	☐	☐	☐	☐
The risk management framework is tailored to the type of organisation, its industry or sector, its architecture (i.e. functional areas and operating units) and processes	☐	☐	☐	☐
The risk management framework is holistic, taking a systemic view to integrate risk management within the organisation, countering the effects of silos (even possible silos of risk excellence such as the IT or insurance functions) in functions or operating units	☐	☐	☐	☐
The organisation's Internal Audit (IA) function is aligned with the risk management framework, giving input into the design of risk controls and/or auditing them	☐	☐	☐	☐
The organisation utilises "risk champions" to carry the risk management framework into the operating units and functional areas to support achievement of objectives	☐	☐	☐	☐
The organisation Integrates ERM with other existing practices and processes such as strategic planning, budgeting, audit etc.	☐	☐	☐	☐
The organisation utilises corporate governance issues, such as compliance to industry or listed-company codes, in developing the risk management framework design	☐	☐	☐	☐
The organisation has an appropriate time plan for implementation of risk management	☐	☐	☐	☐

Are there any additional items or components relevant to this dimension that you believe should be included for the measurement of this dimension?

Any comments on this dimension?

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Establish Context (EC)

This dimension of ERM encompasses first step of risk management implementation; evaluating and understanding the organisation and its context and putting into practice elements of Framework Design. This includes measuring the organisation's articulation of its values, objectives and resources and taking cognisance of internal and external parameters when implementing risk management and defining risk criteria i.e. risk appetite, the risk model etc.

* **Establish Context**

For each of the following items, please indicate their **relative** importance to the above dimension of ERM **in the context of the other items in the pool.** Each item should be scored.

	Less Important	Moderately Important	Very Important	Of Most Importance *
A defined risk appetite is taken into account in conjunction with the organisation's objectives and decision-making processes	☐	☐	☐	☐
The organisation's risk management framework ensures compliance with legal and regulatory requirements	☐	☐	☐	☐
The organisation has an understanding of its internal context, including structure, roles, accountabilities and policies, objectives and strategies and how they relate to risk management	☐	☐	☐	☐
The organisation has an understanding of its external context, including the legal, regulatory, economic and competetive environment and the key drivers and trends impacting objectives and how they relate to risk management	☐	☐	☐	☐
The organisation explicates and/or quantifies risk tolerance, a measure that indicates excessively high or low risk in order to determine deviation from objectives and inform whether to take more or less risk	☐	☐	☐	☐
The organisation has a common definition of the risk model used for assessing risks, including risk categories, definitions of probability (liklihood), impact (severity) and frequency	☐	☐	☐	☐
The organisation intends to utilise risk management for value creation	☐	☐	☐	☐
The organisation considers a broad base of stakeholders such as customers and suppliers in establishing the context for risk management	☐	☐	☐	☐
The organisation develops a risk management culture that influences employees and stakeholders to consider risk information in their decisions	☐	☐	☐	☐
Management and employees understand the organisation's risk management objectives and how they relate to and effect their job and tasks	☐	☐	☐	☐
The accountability for identification, evaluation, assessment and management of risks lies with those employees in the organisation closest to the source of the risks	☐	☐	☐	☐
The organisation's risk management framework spans across the organisation, and employees have a clear understanding of their roles and responsibilities with regards to risk management	☐	☐	☐	☐

Are there any additional items or components relevant to this dimension that you believe should be included for the measurement of this dimension?

Any comments on this dimension?

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Risk Assessment (RA)

This dimension of ERM measures the organisation's risk assessment framework as applied in practice, including risk identification, risk analysis and risk evaluation

* **Risk Assessment**

For each of the following items, please indicate their **relative** importance to the above dimension of ERM **in the context of the other items in the pool.** Each item should be scored.

	Less Important	Moderately Important	* Very Important	Of Most Importance
Formal risk identification and assessment is conducted throughout the organisation on a regular basis	☐	☐	☐	☐
The organisation quantifies its key risks to the best extent possible	☐	☐	☐	☐
The organisation utilises methods such as workshops, surveys, group discussions etc. to identify and assess risk	☐	☐	☐	☐
The organisation actively screens the media, including social media, for potential risks	☐	☐	☐	☐
The organisation defines clear criteria reflecting the organisation's values, objectives and resources to evaluate the significance, nature and level of risk (i.e. a risk model, risk appetite definition)	☐	☐	☐	☐
The organisation takes into account combinations of multiple risks and interdependenices of risks, the effect of which could be compounded or cumulative (systemic risk)	☐	☐	☐	☐
The organisation evaluates risks using both qualitative (Rating scales, risk prioritisation, Heat Maps) and quantitative techniques (simulation, Monte Carlo analysis, Value At Risk)	☐	☐	☐	☐
The organisation ties risk quantification throughout the organisation to a common matrix or metric such as the capital budget or revenues	☐	☐	☐	☐
The organisation takes into consideration a comprehensive range of risks from all relevant categories such as financial, operational and reputational	☐	☐	☐	☐
Different functions in the organisation, such as marketing and technical, are cognisant that they share some key risks, for example product quality	☐	☐	☐	☐
The organisation's employees are trained in utilising the risk assessment tools and outputs appropriate for their role in risk assessment	☐	☐	☐	☐

Are there any additional items or components relevant to this dimension that you believe should be included for the measurement of this dimension?

Any comments on this dimension?

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Risk Treatment (RT)

This dimension of ERM measures the organisation's process to select, prepare and implement treatment plans, mitigation measures and controls addressing risks, for example, by utilising the 4Ts: Tolerate, Treat, Transfer or Terminate, of risk response

* **Risk Treatment**

For each of the following items, please indicate their **relative** importance to the above dimension of ERM **in the context of the other items in the pool.** Each item should be scored.

	Less Important	Moderately Important	Very Important	Of Most Importance
In mitigating risks, the organisation consciously pursues a variety of options, including avoiding, accepting, reducing or transfering risks	☐	☐	☐	☐
The organisation develops and determines risk mitigation strategies within the business or operating unit level, closest to the risks	☐	☐	☐	☐
The organisation captures decided upon risk responses, treatments, mitigation actions and accountability in a risk register	☐	☐	☐	☐
Risk treatment also considers the identification and exploitation of opportunities for the organisation (opportunity or upside of risk)	☐	☐	☐	☐
Capital and/or budget is allocated to areas of the business based on successful outcomes of the risk treatment process	☐	☐	☐	☐
The organisation scans its environment to plan in anticipation of emerging risks that could effect it in the future, and prepares for unpredictable, low liklihood/high impact risks - so-called "Black Swans" events (Risk resilience)	☐	☐	☐	☐
Risk treatment plans of the organisation clearly document the implemention of treatment options including the reason for selection of the option and expected benefit to be gained	☐	☐	☐	☐
Risk treatment plans of the organisation clearly document the individuals accountable for approving the plan, those responsible for implementing the plan and the expected outcome	☐	☐	☐	☐
Risk controls are consistent with the the organisation's risk tolerances, and the risk treatment process ensures that if a risk is beyond the established risk appetite it is terminated or not taken	☐	☐	☐	☐
The organisation's treatment of risk develops from focusing on risk avoidance and mitigation to leveraging risk and risk management options that extract value and focus on reward / upside	☐	☐	☐	☐
The organisation's Business Continuity Planning (BCP) and/or Disaster Management (DM) is aligned with the risk management and risk mitigation process in preparation for crisis and unknown, emerging risks	☐	☐	☐	☐

Are there any additional items or components relevant to this dimension that you believe should be included for the measurement of this dimension?

Any comments on this dimension?

UNIVERSITEIT STELLENBOSCH UNIVERSITY

Risk Monitoring & Review (RM&R)

This dimension of ERM measures the organisation's risk monitoring, control and review procedure for the operational components of the risk management process including risk assessment and risk treatment

* **Risk Monitoring & Review**

For each of the following items, please indicate their **relative** importance to the above dimension of ERM **in the context of the other items in the pool.** Each item should be scored.

	Less Important	Moderately Important	Very Important	Of Most Importance
Risk management allows the organisation to measure risk-adjusted performance among different operating / business units	☐	☐	☐	☐
Key Performance Indicators (KPIs) are utilised throughout the organisation for measuring the risk-based performance of those accountable for specific risks	☐	☐	☐	☐
The organisation's management compensation is linked to risk management performance measures	☐	☐	☐	☐
The organisation's audit committee / Internal Audit (IA) function is an integral part of the risk management process and linked to it to provide assessments	☐	☐	☐	☐
The organisation's risk monitoring and review process ensures that analysis and lessons learned from risk events such as near misses, losses and successes are incorporated in the risk management process	☐	☐	☐	☐
Action plans relating to risks and their treatment are distributed and assigned to individual owners in the organisation and systematically followed up on	☐	☐	☐	☐
The organisation utilises a Risk Management Information System or similar IT system or Software (SW) to review and monitor risks and risk treatment in a comprehensive, structured and systematic way, providing a central repository from which to generate action plans and reports	☐	☐	☐	☐
Each area of the organisation is aware of and regularly updates and reviews the register of its top risks	☐	☐	☐	☐
The organisation utilises risk management analysis proactively for planning future actions such as budgeting and investment decisions	☐	☐	☐	☐
The organisation utilises Key Risk Indicators (KRIs), forward trend measurements, to monitor and report on risks	☐	☐	☐	☐
The organisation examines the relevance and quality of data collected and utilised in the risk management process	☐	☐	☐	☐
The outputs of the risk management process are challenged within the organisation for example by stress testing or analysis of losses	☐	☐	☐	☐

Are there any additional items or components relevant to this dimension that you believe should be included for the measurement of this dimension?

Any comments on this dimension?

UNIVERSITEIT STELLENBOSCH UNIVERSITY

Framework Monitoring & Review (FM&R)

This dimension of ERM measures the organisation's monitoring and review process for the risk management framework in both an internal and external context, ensuring that the risk management plans and policies are being followed and that risk management continues to be appropriate, effective and supportive of organisational performance

* **Framework Monitoring & Review**

For each of the following items, please indicate their **relative** importance to the above dimension of ERM **in the context of the other items in the pool.** Each item should be scored.

	Less Important	Moderately Important	Very Important	Of Most Importance
The organisation has established and regularly updated written policy and procedure manuals that are consistent accross major risks and the risk management framework	☐	☐	☐	☐
The organisation's ERM framework is regularly reviewed for compliance with new legal and regulatory requirements	☐	☐	☐	☐
The organisation's risk committee meets regularly, reporting on progress of the organisation's risk management framework implementation	☐	☐	☐	☐
The organisation regularly assesses the efficiency of the risk management process	☐	☐	☐	☐
Decision making in the organisation, including the development and setting of objectives, is aligned with the outcomes of the risk management process	☐	☐	☐	☐
The risk management framework, policy and plan are periodically reviewed for effectiveness and appropriateness given changes in the organisation's internal and external context	☐	☐	☐	☐
To ensure traceability of its risk management activities, methods, tools and the overall risk management process are recorded and retained within the organisation	☐	☐	☐	☐
The organisation makes use of Internal Audit (IA) to monitor and review the risk management framework	☐	☐	☐	☐
The organisation makes use of an external auditor or consultants to monitor and review the risk management framework	☐	☐	☐	☐
The organisation ensures boundaries set around the risk management framework i.e. following policies and procedures, are upheld	☐	☐	☐	☐

Are there any additional items or components relevant to this dimension that you believe should be included for the measurement of this dimension?

Any comments on this dimension?

UNIVERSITEIT STELLENBOSCH UNIVERSITY

Communication & Consultation (C&C)

This dimension of ERM measures all aspects of the organisation's internal and external consultation, communication and reporting around risk management, and the iterative process conducted to provide, share or obtain information and engage in dialogue with stakeholders regarding the organisation's management of risk.

* **Communication & Consultation**

For each of the following items, please indicate their **relative** importance to the above dimension of ERM **in the context of the other items in the pool.** Each item should be scored.

	Less Important	Moderately Important	Very Important	Of Most Importance
The organisation regularly communicates with all stakeholders on risk management performance	☐	☐	☐	☐
There is an organisation-wide common language for communicating risks, risk management activities and monitoring efforts	☐	☐	☐	☐
Internal communication and reporting mechanisms support and encourage accountability and ownership of risk within the organisation	☐	☐	☐	☐
External communication and reporting mechanisms engage appropriate external stakeholders, ensuring the organisation effectively exchanges risk information and provides clarity in risk disclosure	☐	☐	☐	☐
The organisation utilises external communication of the organisation's risk management activities to build confidence in the organisation	☐	☐	☐	☐
Resources and information on risk management are readily accessible to all employees, for example on the organisation's Intranet	☐	☐	☐	☐
The risk management function of the organisation builds and sustains relationships across all areas of the organisation including executive leadership	☐	☐	☐	☐
Transparency on risk information both positive and negative is rewarded within the organisation	☐	☐	☐	☐
Risk information is communciated timeously within the organisation	☐	☐	☐	☐
Quality risk information is demmanded as part of the decision-making process within the organisation	☐	☐	☐	☐
The organisation has an accessible forum for communication around risk issues	☐	☐	☐	☐
The organisation has a clearly defined chain of accountability and escalation for risk managemement issues	☐	☐	☐	☐

Are there any additional items or components relevant to this dimension that you believe should be included for the measurement of this dimension?

Any comments on this dimension?

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Continual Improvement (CI)

This dimension of ERM measures the organisation's process for continual improvement of the risk management policy, plan and framework.

* **Continual Improvement**

For each of the following items, please indicate their **relative** importance to the above dimension of ERM **in the context of the other items in the pool.** Each item should be scored.

	Less Important	Moderately Important	Very Important	Of Most Importance
Based on results of monitoring and reviews, the organisation's risk management framework, policy and plan are continuously updated and improved	☐	☐	☐	☐
The quality of the organisation's risk management process is regularly evaluated by external auditors or consultants with written assessments provided	☐	☐	☐	☐
The quality of the organisation's risk management process is regularly evaluated by Internal Audit (IA) with written assessments provided	☐	☐	☐	☐
The organisation learns from experience and adjusts its risk management practices to improve its ability to measure and manage risk	☐	☐	☐	☐
The organisation incorporates risk management insights to develop its human capital processes and drive sustainable performance	☐	☐	☐	☐
In the organisation, all employees take responsibility for improving risk management	☐	☐	☐	☐
Insights on risk provided by employees are rewarded and encouraged in the organisation	☐	☐	☐	☐
The risk management function is developing resources and skills to meet the organisation's objectives	☐	☐	☐	☐
The organisation has channels for confidential reporting of risk information i.e. "Whistleblower" hotlines	☐	☐	☐	☐
The organisation has a risk management performance process in place to identify and reward appropriate risk behaviour	☐	☐	☐	☐

Are there any additional items or components relevant to this dimension that you believe should be included for the measurement of this dimension?

Any comments on this dimension?

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The ERM dimensions surveyed were as follows:

Mandate & Commitment
Framework Design
Establish Context
Risk Assessment
Risk Treatment
Risk Monitoring & Review
Framework Monitoring & Review
Communication & Consultation
Continual Improvement

Please indicate below any additional dimensions (components) that you believe are key success factors for an ERM framework or implementation that have not been included in this survey along with a brief description thereof.

Are there any other comments or feedback you would like to provide?

If you are interested in receiving selected research results and additional information on ERM and the ERM maturity index, please type your email address in the space below. Thanks!

APPENDIX D: PRE-STUDY (PILOT) RISK MANAGEMENT VALUES AND CULTURE SURVEY – TELECOMS MULTI-NATIONALS

UNIVERSITEIT STELLENBOSCH UNIVERSITY

Survey of culture and risk management

This survey forms part of academic research at the University of Stellenbosch Business School (USB) in South Africa. The purpose of this research is to understand life and work experiences of managers, with a particular emphasis on enterprise risk management.

Your participation in this survey is voluntary, and the information you provide will be kept completely confidential. No individual respondent will be identified to any other person. Some organisations participating in this study have requested aggregated anonymous data to be provided for informational purposes. You have the opportunity to request selected anonymous results and additional information at the end of the survey.

The survey is expected to take approximately 15 minutes. On the following pages, you are asked to respond to a number of statements that reflect your observations of cultural or societal experiences, values, and views on risk management practices.

Please note, this is not a test and there are no "right" or "wrong" answers. You are requested to answer all of the questions as openly and honestly as possible. You should not think too much about each question and answer quickly, because usually, the first response that comes to mind is the most applicable. The questions are not designed to judge whether an answer is good or bad, they are designed to observe different values and experiences.

For the purpose of this survey, please consider your nation / country as representing your society and your company as your organisation.

Thank you very much for your time and consideration.

Section 1 - The way things <u>are</u> in your society

In this section of the survey we are interested in your beliefs about the norms, values, and practices in your society. In other words, we are interested in <u>the way your society is</u> - not the way you think it should be.

There are no right or wrong answers, and answers don't indicate goodness or badness of the society.

Please respond to the questions by selecting the point in the scale that most closely represents your observations about your society.

Please consider your nation / country as representing your society.

In this society, orderliness and consistency are stressed, even at the expense of experimentation and innovation

Strongly Agree			Neither Agree Nor Disagree			Strongly Disagree
1	2	3	4	5	6	7

In this society, societal requirements and instructions are spelled out in detail so citizens know what they are expected to do

Strongly Agree			Neither Agree Nor Disagree			Strongly Disagree
1	2	3	4	5	6	7

In this society, most people lead highly structured lives with few unexpected events

Strongly Agree			Neither Agree Nor Disagree			Strongly Disagree
1	2	3	4	5	6	7

In this society, teen-aged students are encouraged to strive for continuously improved performance

Strongly Agree			Neither Agree nor Disagree			Strongly Disagree
1	2	3	4	5	6	7

In this society, major rewards are based on:

Only performance effectiveness			Performance effectiveness and other factors (i.e. seniority or political connections)			Only factors other than performance effectiveness (i.e. seniority or political connections)
1	2	3	4	5	6	7

In this society, the accepted norm is to:

Plan for the future						Accept the status quo
1	2	3	4	5	6	7

In this society, more people:

Live for the present than live for the future						Live for the future than live for the present

for the future present

1 2 3 4 5 6 7

In this society, followers are expected to:

Obey their leader without question — Question their leaders when in disagreement

1 2 3 4 5 6 7

In this society, power is:

Concentrated at the top — Shared throughout society

1 2 3 4 5 6 7

The way to be successful in this society is to:

Plan ahead — Take life events as they occur

1 2 3 4 5 6 7

In this society, a person's influence is based primarily on:

One's ability and contribution to the society — The authority of one's position

1 2 3 4 5 6 7

In this society, leaders encourage group loyalty even if individual goals suffer.

Strongly Agree — Neither Agree Nor Disagree — Strongly Disagree

1 2 3 4 5 6 7

In this society, social gatherings are:

Planned well in advance (2 or more weeks in advance) — Spontaneous (Planned less than an hour in advance)

1 2 3 4 5 6 7

The economic system in this society is designed to maximise:

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Section 2 - How important is...

In this section, you will be asked how important certain things are to you, and whether you agree or disagree with certain statements.

Please read the statement carefully and select the one response to each item that most closely represents your view.

Please think of an ideal job, *disregarding your present job*. In choosing an ideal job, how important would it be to you to...

Have sufficient time for your personal or home life

- Of utmost importance
- Very important
- Of moderate importance
- Of little importance
- Of very little or no importance

Have a boss (direct superior) you can respect

- Of utmost importance
- Very important
- Of moderate importance
- Of little importance
- Of very little or no importance

Get recognition for good performance

- Of utmost importance
- Very important
- Of moderate importance
- Of little importance
- Of very little or no importance

Have security of employment

- Of utmost importance
- Very important
- Of moderate importance
- Of little importance

- Of little importance
- Of very little or no importance

***In your private life*, how important is each of the following to you:**

Keeping time free for fun

- Of utmost importance
- Very important
- Of moderate importance
- Of little importance
- Of very little or no importance

Moderation: Having few desires

- Of utmost importance
- Very important
- Of moderate importance
- Of little importance
- Of very little or no importance

Doing a service to a friend

- Of utmost importance
- Very important
- Of moderate importance
- Of little importance
- Of very little or no importance

Thrift (Not spending more than is needed)

- Of utmost importance
- Very important
- Of moderate importance
- Of little importance
- Of very little or no importance

General questions:

How often do you feel nervous or tense?

- I always feel this way
- I usually feel this way
- I sometimes feel this way
- I seldom feel this way
- I never feel this way

- Strongly agree
- Agree
- Undecided
- Disagree
- Strongly disagree

Persistent efforts are the surest way to results

- Strongly agree
- Agree
- Undecided
- Disagree
- Strongly disagree

An organisational structure in which certain subordinates have two bosses should be avoided at all costs

- Strongly agree
- Agree
- Undecided
- Disagree
- Strongly disagree

A company's or organisation's rules should not be broken - not even when the employee thinks breaking the rule would be in the organisation's best interest

- Strongly agree
- Agree
- Undecided
- Disagree
- Strongly disagree

Developing a risk management culture that influences employees and stakeholders to consider risk information in their decisions

Of very little or no importance		Of moderate importance		Of utmost importance
○	○	○	○	○
1	2	3	4	5

Giving employees across the organisation a clear understanding of their roles and responsibilities with regards to risk management

Of very little or no importance		Of moderate importance		Of utmost importance
○	○	○	○	○
1	2	3	4	5

Embedding risk management in practices and processes in a way that is relevant, effective and efficient.

Of very little or no importance		Of moderate importance		Of utmost importance
○	○	○	○	○
1	2	3	4	5

Tailoring risk management to the type of organisation, its industry or sector, its structure (i.e. functional areas and operating units) and processes

Of very little or no importance		Of moderate importance		Of utmost importance
○	○	○	○	○
1	2	3	4	5

A corporate risk management policy clearly stating objectives for, and commitment to, risk management

Of very little or no importance		Of moderate importance		Of utmost importance
○	○	○	○	○
1	2	3	4	5

Leadership conveying the value proposition and benefits of risk management to employees

Of very little or no importance		Of moderate importance		Of utmost importance
○	○	○	○	○
1	2	3	4	5

A corporate governance structure reflecting the influence of risk and risk management on decison-making across the organisation

Of very little or no importance — Of moderate importance — Of utmost importance

1 2 3 4 5

A risk management department / function exerting real authority derived from executive leadership

Of very little or no importance — Of moderate importance — Of utmost importance

1 2 3 4 5

Senior management clearly defining and endorsing the risk management policy

Of very little or no importance — Of moderate importance — Of utmost importance

1 2 3 4 5

Taking into consideration a wide, comprehensive range of risks to the organisation, such as financial, operational, reputational etc.

Of very little or no importance — Of moderate importance — Of utmost importance

1 2 3 4 5

Formal risk identification and assessment conducted throughout the organisation on a regular basis

Of very little or no importance — Of moderate importance — Of utmost importance

1 2 3 4 5

Action plans relating to risks and their treatment distributed to individual owners and systematically followed up on

Of very little or no importance — Of moderate importance — Of utmost importance

1 2 3 4 5

Developing and determining risk mitigation strategies within the business or operating unit level, closest to the risks

Of very little or no importance — Of moderate importance — Of utmost importance

1 2 3 4 5

Understanding the organisation's external context, including the legal, regulatory, economic and competetive environment, key drivers and trends, and how they relate to risk management

Of very little or no importance — Of moderate importance — Of utmost importance

1 2 3 4 5

Taking a holistic, systematic view to integrate risk management within the organisation - countering the effects of silos

Of very little or no importance — Of moderate importance — Of utmost importance

1 2 3 4 5

Leadership setting clear expectations and strategic direction for risk management

Of very little or no importance — Of moderate importance — Of utmost importance

1 2 3 4 5

A visible risk management "sponsor" or "champion" in senior management

Of very little or no importance — Of moderate importance — Of utmost importance

1 2 3 4 5

Demanding quality risk information as part of the decision-making process of the organisation

Of very little or no importance — Of moderate importance — Of utmost importance

1 2 3 4 5

Integrating risk management with other existing practices and processes such as strategic planning, budgeting etc.

Of very little or no importance — Of moderate importance — Of utmost importance

1 2 3 4 5

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Section 4 - Demographic questions

*The following questions are about background information for statistical purposes. Questions with a red * are required for a valid survey response.*

These questions are NOT used to identify any individual, though you have the opportunity to provide an email address if you would like to be contacted for additional information or selected survey results.

Are you?

- ◯ Male
- ◯ Female

*What is your nationality?

- ◯ South African
- ◯ South African and other(s)
- ◯ Other(s) - Please specify

*In which country are you employed?

- ◯ South Africa
- ◯ Other (Please specify)

*What organisation do you work for?
This information will be kept strictly confidential; some organisations participating in the study have requested anonymous, aggregated results for informational purposes

- ◯ MTN
- ◯ Other (Please specify)

*In which industry are you currently employed?

- ◯ Telecommunications or Information and Communications Technology (ICT)
- ◯ Other (Please specify)

In which country were you born?

- ◯ South Africa
- ◯ Other (please specify)

What is your age?

- ◯ (<25)
- ◯ (26-35)
- ◯ (36-45)
- ◯ (46-55)

(>55)

What is your level of formal education?

Did not complete school

Completed school

Some formal coursework beyond school i.e. university/technicon, professional certifications etc.

Completed first university / technicon degree (i.e. Bachelors, Engineering Diploma)

Completed additional tertiary university degree(s) (i.e. Masters, PhD)

Please indicate the function you are employed in:

Sales / Marketing

Technical / Support

Finance / Accounting

Planning / Purchasing

Human Resources / Personnel

Audit / Risk Management

Administration

Operations

Other (Please specify)

How many years of full-time work experience do you have?
In years:

How many people report to you in total?
Number of people:

How many levels of management are there between you and the chief executive of your organisation?

None, I am the CE

One, I report to the CE

Two, my manager reports to the CE

Three, my manager's manager reports to the CE

Four or more, there are three or more managers between me and the CE

What is the approximate size of your organisation *in your country*?

Less than 10 employees

10 to 100 employees

100 to 500 employees

500 to 1000 employees

> 1000 employees

What is your ethnicity i.e. tribe or cultural grouping?
Please specify:

Would you be interested in receiving information regarding selected survey results or risk management?

If so please specify your email address here:

If you have indicated your interest in receiving information by including your email address above, you can expect feedback within a few weeks of completing the survey.

Thank you very much for your time and consideration in completing this survey!

APPENDIX E:

FULL IRMSA RISK MANAGEMENT VALUES AND CULTURE SURVEY

University of Stellenbosch
Business School

Survey of risk management and culture

This survey forms part of academic research at the University of Stellenbosch Business School (USB) in South Africa. The purpose of this research is to understand life and work experiences of managers, with a particular emphasis on risk management and cultural values.

Your participation in this survey is voluntary, and the information you provide will be kept completely confidential. No individual respondent will be identified to any other person. Some organisations participating in this study have requested aggregated anonymous data to be provided for informational purposes. You have the opportunity to request selected anonymous results and additional information at the end of the survey. The survey is expected to take less than 15 minutes.

On the following pages, you are asked to respond to a number of statements that reflect your observations of cultural or societal experiences, values, and views on risk management practices. Please note, this is not a test and there are no "right" or "wrong" answers. You are requested to answer all of the questions as openly and honestly as possible. You should not think too much about each question and answer quickly, because usually, the first response that comes to mind is the most applicable. The questions are not designed to judge whether an answer is good or bad, they are designed to observe different values and experiences.

For the purpose of this survey, please consider your own nation / country as representing your society and your company as your organisation.

Thank you very much for your time and consideration.

Section 1 - The way things <u>are</u> in your society

In this section of the survey we are interested in your beliefs about the norms, values, and practices in your society. In other words, we are interested in <u>the way your society is</u> - not the way you think it should be.

There are no right or wrong answers, and answers don't indicate goodness or badness of the society.

Please respond to the questions by selecting the point in the scale that most closely represents your observations about your society.

Please consider your nation / country as representing your society.

The way things are in your society

	Strongly Agree 1	2	3	Neither Agree Nor Disagree 4	5	6	Strongly Disagree 7
In this society, orderliness and consistency are stressed, even at the expense of experimentation and innovation	○	○	○	○	○	○	○
In this society, societal requirements and instructions are spelled out in detail so citizens know what they are expected to do	○	○	○	○	○	○	○
In this society, most people lead highly structured lives with few unexpected events	○	○	○	○	○	○	○
In this society, teen-aged students are encouraged to strive for continuously improved performance	○	○	○	○	○	○	○
In this society, leaders encourage group loyalty even if individual goals suffer	○	○	○	○	○	○	○
In this society, rank and position in the hierarchy have special privileges	○	○	○	○	○	○	○
In this society, being accepted by the other members of the group is very important	○	○	○	○	○	○	○

In this society, major rewards are based on:

Only performance effectiveness			Performance effectiveness and other factors (i.e. seniority or political connections)			Only factors other than performance effectiveness (i.e. seniority or political connections)
○	○	○	○	○	○	○
1	2	3	4	5	6	7

In this society, the accepted norm is to:

Plan for the future						Accept the status quo
○	○	○	○	○	○	○
1	2	3	4	5	6	7

In this society, more people:

Live for the present than live for the future	Live for the future than live for the present

1	2	3	4	5	6	7
○	○	○	○	○	○	○

In this society, followers are expected to:

	1	2	3	4	5	6	7	
Obey their leader without question	○	○	○	○	○	○	○	Question their leaders when in disagreement

In this society, power is:

	1	2	3	4	5	6	7	
Concentrated at the top	○	○	○	○	○	○	○	Shared throughout society

The way to be successful in this society is to:

	1	2	3	4	5	6	7	
Plan ahead	○	○	○	○	○	○	○	Take life events as they occur

In this society, a person's influence is based primarily on:

	1	2	3	4	5	6	7	
One's ability and contribution to the society	○	○	○	○	○	○	○	The authority of one's position

In this society, social gatherings are:

	1	2	3	4	5	6	7	
Planned well in advance (2 or more weeks in advance)	○	○	○	○	○	○	○	Spontaneous (Planned less than an hour in advance)

The economic system in this society is designed to maximise:

	1	2	3	4	5	6	7	
Individual interests	○	○	○	○	○	○	○	Collective interests

In this society, being innovative to improve performance is generally:

Substantially rewarded			Somewhat rewarded			Not rewarded
1	2	3	4	5	6	7

This society has rules or laws to cover:

Almost all situations			Some situations			Very few situations
1	2	3	4	5	6	7

In this society, people in positions of power try to:

Increase their social distance from less powerful individuals						Decrease their social distance from less powerful people
1	2	3	4	5	6	7

In this society, people place more emphasis on:

Solving current problems						Planning for the future
1	2	3	4	5	6	7

In this society:

Group cohesion is valued more than individualism			Group cohesion and individualism are equally valued			Individualism is valued more than group cohesion
1	2	3	4	5	6	7

University of Stellenbosch Business School

Section 2 - How important is...

In this section, you will be asked how important certain things are to you, and whether you agree or disagree with certain statements.

Please read the statement carefully and select the one response to each item that most closely represents your view.

Please think of an ideal job, *disregarding your present job*. In choosing an ideal job, how important would it be to you to...

	Of utmost importance	Very important	Of moderate importance	Of little importance	Of very little or no importance
Have sufficient time for your personal or home life	○	○	○	○	○
Have a boss (direct superior) you can respect	○	○	○	○	○
Get recognition for good performance	○	○	○	○	○
Have security of employment	○	○	○	○	○
Have pleasant people to work with	○	○	○	○	○
Do work that is interesting	○	○	○	○	○
Be consulted by your boss in decisions involving your work	○	○	○	○	○
Live in a desirable area	○	○	○	○	○
Have a job respected by your family and friends	○	○	○	○	○
Have chances for promotion	○	○	○	○	○

***In your private life*, how important is each of the following to you:**

	Of utmost importance	Very important	Of moderate importance	Of little importance	Of very little or no importance
Keeping time free for fun	○	○	○	○	○
Moderation: Having few desires	○	○	○	○	○
Doing a service to a friend	○	○	○	○	○
Thrift (Not spending more than is needed)	○	○	○	○	○

To what extent do you agree or disagree with the following statements?

	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
One can be a good manager without having precise answers to every question that subordinates may raise about their work	○	○	○	○	○
Persistent efforts are the surest way to results	○	○	○	○	○
An organisational structure in which certain subordinates have two bosses should be avoided at all costs	○	○	○	○	○
A company's or organisation's rules should not be broken - not even when the employee thinks breaking the rule would be in the organisation's best interest	○	○	○	○	○

General questions:

How often do you feel nervous or tense?

- ○ I always feel this way
- ○ I usually feel this way
- ○ I sometimes feel this way
- ○ I seldom feel this way
- ○ I never feel this way

Are you a happy person?

- ○ Always
- ○ Usually
- ○ Sometimes
- ○ Seldom
- ○ Never

Do other people or circumstances ever prevent you from doing what you really want to do?

- ○ Yes, always
- ○ Yes, usually
- ○ Sometimes
- ○ No, seldom
- ○ No, never

All in all, how would you describe the state of your health these days?

- ○ Very good
- ○ Good
- ○ Fair
- ○ Poor
- ○ Very Poor

How proud are you to be a citizen of your country?

- Not proud at all
- Not very proud
- Somewhat proud
- Fairly proud
- Very proud

How often, in your experience, are subordinates afraid to contradict their boss?

- Never
- Seldom
- Sometimes
- Usually
- Always

University of Stellenbosch Business School

Section 3 - Risk management

This section deals with questions relating to risk management in the work environment. Risk management is a process followed to identify, assess and mitigate the risks facing an organisation.

*You will be asked about your beliefs regarding the importance of various risk management practices **from your own perspective** as a member of your organisation.*

For this section, please select the one response on the scale that most closely represents your view on the importance of each statement.

How important are the following risk management practices to you:

	Of very little or no importance			Of moderate importance			Of utmost importance
	1	2	3	4	5	6	7
A clearly defined chain of accountability and escalation for risk management issues	○	○	○	○	○	○	○
A risk management function that builds and sustains relationships across all areas of the organisation	○	○	○	○	○	○	○
Demanding quality risk information as part of the decision-making process of the organisation	○	○	○	○	○	○	○

	Of very little or no importance			Of moderate importance			Of utmost importance
	1	2	3	4	5	6	7
All employees taking responsibility for improving risk management	○	○	○	○	○	○	○
Learning from experience by adjusting risk management							

practices to improve the ability to measure and manage risk	○	○	○	○	○	○	○

	Of very little or no importance			Of moderate importance			Of utmost importance
	1	2	3	4	5	6	7
Developing a risk management culture that influences employees and stakeholders to consider risk information in their decisions	○	○	○	○	○	○	○
Understanding the organisation's external context, including the legal, regulatory, economic and competetive environment, key drivers and trends, and how they relate to risk management	○	○	○	○	○	○	○
Giving employees across the organisation a clear understanding of their roles and responsibilities with regards to risk management	○	○	○	○	○	○	○

	Of very little or no importance			Of moderate importance			Of utmost importance
	1	2	3	4	5	6	7
Embedding risk management in practices and processes in a way that is relevant, effective and efficient	○	○	○	○	○	○	○
An organisational risk management policy clearly stating objectives for, and commitment to, risk management	○	○	○	○	○	○	○
Tailoring risk management to the type of organisation, its industry or							

sector, its structure (i.e.functional areas and operating units) and processes							
Taking a holistic, systematic view to integrate risk management within the organisation - countering the effects of silos							
Integrating risk management with other existing practices and processes such as strategic planning, budgeting etc.							

	Of very little or no importance			**Of moderate importance**			**Of utmost importance**
	1	**2**	**3**	**4**	**5**	**6**	**7**
Leadership conveying the value proposition and benefits of risk management to employees							
An organisational governance structure reflecting the influence of risk and risk management on decison-making accross the organisation							
Leadership setting clear expectations and strategic direction for risk management							
A visible risk management "sponsor" or "champion" in senior management							
Senior management clearly defining and endorsing the risk management policy							
A risk management department / function exerting real authority derived from executive leadership							

	Of very little or no importance			Of moderate importance			Of utmost importance
	1	2	3	4	5	6	7
Taking into consideration a wide, comprehensive range of risks to the organisation, such as financial, operational, reputational etc.	○	○	○	○	○	○	○
Formal risk identification and assessment conducted throughout the organisation on a regular basis	○	○	○	○	○	○	○

	Of very little or no importance			Of moderate importance			Of utmost importance
	1	2	3	4	5	6	7
Action plans relating to risks and their treatment distributed to individual owners and systematically followed up on	○	○	○	○	○	○	○
Developing and determining risk mitigation strategies within the business or operating unit level, closest to the risks	○	○	○	○	○	○	○

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Section 4 - Demographic questions

The following questions are about background information for statistical purposes.

These questions are NOT used to identify any individual, though you have the opportunity to provide an email address if you would like to participate in the prize raffle for 3x R500 Exclusive Books vouchers or be contacted for additional information or selected survey results.

Are you?

- Male
- Female

What is your nationality?

- South African
- Zimbabwean
- Botswanan
- Zambian
- Namibian
- Swazi
- Basotho
- UK
- Kenyan
- Other(s) or more than one - Please specify

In which country are you employed?

- South Africa
- Zimbabwe
- Botswana
- Namibia
- Zambia
- UK
- Lesotho
- Swaziland
- Kenya
- Other (Please specify)

In which country were you born?

- Country of nationality

- ◯ Other (please specify) [ ]

What is your age?

- ◯ (<25)
- ◯ (26-35)
- ◯ (36-45)
- ◯ (46-55)
- ◯ (>55)

What is your level of formal education?

- ◯ Did not complete school
- ◯ Completed school
- ◯ Some formal coursework beyond school i.e. university/technicon, professional certifications etc.
- ◯ Completed first university / technicon degree (i.e. Bachelor's, Engineering Diploma)
- ◯ Completed additional tertiary university degree(s) (i.e. Master's, PhD)

In which sector are you currently employed?

- ◯ Government
- ◯ State Owned Enterprise (SOE)
- ◯ Private Sector
- ◯ Other (Please specify) [ ]

In which industry are you currently employed?

- ◯ National, Provinical or Municipal Government
- ◯ Energy (Oil, Gas & Coal)
- ◯ Materials (Chemicals, Packaging, Metals, Paper)
- ◯ Industrials (Capital Goods & Services Including Transport)
- ◯ Consumer Discretionary (Retail, Travel, Automotive)
- ◯ Consumer Staples (Food, Beverage, Household Products)
- ◯ Health Care
- ◯ Financials
- ◯ Information Technology
- ◯ Utilities
- ◯ Other (Please specify) [ ]

Please indicate the function you are employed in:

- ◯ Audit / Risk Management
- ◯ Technical / Support
- ◯ Finance / Accounting
- ◯ Planning / Purchasing
- ◯ Human Resources / Personnel
- ◯ Sales / Marketing

- ◯ Administration
- ◯ Operations
- ◯ Other (Please specify) _____

How many years of full-time work experience do you have?
In years:
_____

How many people report to you in total?
Number of people:
_____

How many levels of management are there between you and the Chief Executive (CE) of your organisation?

- ◯ None, I am the CE
- ◯ One, I report to the CE
- ◯ Two, my manager reports to the CE
- ◯ Three, my manager's manager reports to the CE
- ◯ Four or more, there are three or more managers between me and the CE

What is the approximate size of your organisation *in your country*?

- ◯ Less than 10 employees
- ◯ 10 to 100 employees
- ◯ 100 to 500 employees
- ◯ 500 to 1000 employees
- ◯ > 1000 employees

In relation to similar organisations, would you say your organisation's performance is

- ◯ In the top 10% of performance
- ◯ In the top 25% of performance
- ◯ In the middle 50% of performance
- ◯ In the bottom 25% of performance
- ◯ In the bottom 10% of performance

What is your race?

- ◯ Black African
- ◯ Black Indian/Asian
- ◯ Black Coloured
- ◯ White
- ◯ Other (Please specify) _____

What is your home language, ethnicity, tribal or cultural grouping i.e. English, Afrikaans, Zulu, Xhosa?
Please specify:
_____

Are you interested in:

- ◯ Participating in the prize raffle
- ◯ Receiving information about the culture and risk management study
- ◯ Both

Then please enter your email address below so you can be contacted:

If you have indicated your interest to participate in the prize raffle or receive information about the study, you can expect feedback within a few weeks of the survey closing date.

Thank you very much for your time and consideration in completing this survey!

APPENDIX F:

DESCRIPTIVE STATISTICS FOR THE MAIN STUDY

Variable	Obs	Mean	Std. Dev.	Min	Max
responses	327				
rm_cc_02	326	6.45092	.9840493	1	7
rm_cc_10	324	6.487654	.9125045	1	7
rm_cc_21	324	6.537037	.9286555	1	7
rm_ci_13	326	6.340491	1.027627	1	7
rm_ci_14	323	6.386997	.9532966	1	7
rm_ec_01	321	6.529595	.8440395	1	7
rm_ec_16	321	6.548287	.7974599	1	7
rm_ec_15	320	6.528125	.8261913	1	7
rm_fd_06	325	6.489231	.8410977	1	7
rm_fd_05	322	6.481366	.8360793	1	7
rm_fd_07	323	6.417957	.8750791	1	7
rm_fd_17	322	6.481366	.8285937	1	7
rm_fd_22	325	6.572308	.8417185	1	7
rm_mc_12	324	6.441358	.9857904	1	7
rm_mc_08	324	6.391975	.9330849	1	7
rm_mc_19	325	6.516923	.9012285	1	7
rm_mc_18	325	6.369231	.955317	1	7
rm_mc_20	323	6.588235	.8080251	1	7
rm_mc_11	321	6.367601	.9820626	1	7
rm_ra_03	323	6.551084	.7760129	1	7
rm_ra_04	324	6.469136	.8303294	1	7
rm_rm_09	325	6.461538	.8727161	1	7
rm_rt_23	325	6.52	.8733362	1	7
Risk_1_Org	326	6.463937	.698044	1	7
Risk_2_Mec	326	6.508078	.6746341	1	7
ERMVS_1	326	6.463937	.698044	1	7

Variable	Obs	Mean	Std. Dev.	Min	Max
g_uai_01_re	319	4.112853	1.849645	1	7
g_uai_19_re	315	3.853968	1.785721	1	7
g_uai_16_re	316	3.693038	1.777482	1	7
g_po_15_re	312	4.365385	1.862082	1	7
g_col_07_re	316	4.734177	1.90544	1	7
g_pdi_27_re	315	6.050794	1.437872	1	7
g_col_29_re	317	5.504732	1.485417	1	7
g_po_18_re	326	3.033742	1.478699	1	7
g_fo_04_re	324	3.283951	1.862018	1	7
g_fo_30	324	2.416667	1.451752	1	7
g_pdi_13_re	323	5.235294	1.640063	1	7
g_pdi_34_re	326	6.177914	1.125482	1	7
g_fo_03_re	321	5.090343	1.946455	1	7
g_pdi_05	324	5.04321	1.790407	1	7
g_fo_08_re	325	4.575385	1.543008	1	7
g_col_12	318	2.761006	1.682941	1	7
g_po_20_re	322	4.003106	1.36146	1	7
g_uai_24_re	324	4.987654	1.43804	1	7
g_pdi_26_re	324	5.123457	1.748119	1	7
g_fo_31	327	2.834862	1.491368	1	7
g_col_35_re	324	4.141975	1.930262	1	7
g_uai_agg	309	4.167476	1.131415	1	7
g_fo_agg	313	3.630671	.9707675	1	7
g_pdi_agg	305	5.550164	.9174523	1	7
g_col_agg	302	4.253311	.9732667	1	7
g_po_agg	306	3.784314	1.151839	1	7
h_idv_01	327	4.345566	.6782128	2	5
h_pdi_02	325	4.372308	.8957216	1	5
h_mas_03	325	4.464615	.7429568	1	5
h_idv_04	326	4.233129	.8669703	1	5
h_mas_05	324	3.996914	.9091842	1	5
h_idv_06	326	4.5	.6551571	2	5
h_pdi_07	325	4.403077	.6671224	2	5
h_mas_08	326	4.06135	.8991843	1	5
h_idv_09	325	3.513846	1.153614	1	5
h_mas_10	327	4.366972	.7870955	2	5

Variable	Obs	Mean	Std. Dev.	Min	Max
h_ivr_11	324	4.108025	.793197	1	5
h_ivr_12	323	3.479876	.8049135	1	5
h_lto_13	323	3.879257	.8004095	1	5
h_lto_14	322	3.850932	.9420014	1	5
h_uai_21	324	4.095679	1.041007	1	5
h_lto_22	323	4.19195	.8192162	1	5
h_pdi_23	323	3.563467	1.265217	1	5
h_uai_24	322	3.310559	1.269022	1	5
h_uai_15	326	2.819018	.7850959	1	5
h_ivr_16	325	4.076923	.5417078	2	5
h_ivr_17	326	2.932515	.7815475	1	5
h_uai_18	325	4.092308	.8300505	1	5
h_lto_19	326	3.432515	1.237883	1	5
h_pdi_20	326	3.54908	.9025003	1	5
h_pdi_agg	323	-28.77709	49.39202	-180	95
h_mas_agg	321	-23.94081	46.32392	-180	130
h_uai_agg	321	70.42056	65.21043	-160	235
h_lto_agg	317	-18.01262	56.65373	-170	185
h_ivr_agg	321	-67.8972	54.04731	-230	105
sex					
nationality					
countryemp					
born					
age					
educationlevel					
sector					
industry					
function					
yearsworked					
numberreports					
levelsofmgt					
orgsize					
performance					
rsagrouping					
ethnicity					
mainculture					
subculture					

APPENDIX G:

CFA LOADING OF VARIABLES ON THE TWO-FACTOR ERMV MODEL

		OIM				
Standardized	**Coef.**	**Std. Err.**	**z**	**P>z**	**[95% Conf.**	**Interval]**
Measurement						
rm_cc_02_escalation <-						
ERMVS_1_Organic	.6890051	.0316356	21.78	0.000	.6270005	.7510098
_cons	6.947834	.2919031	23.80	0.000	6.375714	7.519953
rm_cc_10_relationships <-						
ERMVS_1_Organic	.6890523	.0315397	21.85	0.000	.6272356	.7508691
_cons	7.52167	.3150881	23.87	0.000	6.904108	8.139231
rm_ci_13_employeesimproving <-						
ERMVS_1_Organic	.6872135	.0317097	21.67	0.000	.6250637	.7493633
_cons	6.392369	.2695331	23.72	0.000	5.864093	6.920644
rm_ci_14_learnings <-						
ERMVS_1_Organic	.7429498	.0270603	27.46	0.000	.6899126	.795987
_cons	6.883343	.2893019	23.79	0.000	6.316322	7.450364
rm_ec_15_understandroles <-						
ERMVS_1_Organic	.7285387	.0283852	25.67	0.000	.6729048	.7841727
_cons	7.968804	.3331967	23.92	0.000	7.31575	8.621858
rm_fd_06_embedded <-						
ERMVS_1_Organic	.8421907	.017904	47.04	0.000	.8070995	.877282
_cons	7.958657	.3327854	23.92	0.000	7.306409	8.610904
rm_fd_07_tailored <-						
ERMVS_1_Organic	.7480812	.026633	28.09	0.000	.6958814	.800281
_cons	7.431343	.3114342	23.86	0.000	6.820943	8.041743
rm_mc_12_mgtcommunication <-						
ERMVS_1_Organic	.8106704	.0210954	38.43	0.000	.7693241	.8520166
_cons	6.600518	.2779063	23.75	0.000	6.055831	7.145204

		OIM				
Standardized	**Coef.**	**Std. Err.**	**z**	**P>z**	**[95% Conf.**	**Interval]**
rm_mc_08_governance <-						
ERMVS_1_Organic	.869821	.015328	56.75	0.000	.8397787	.8998633
_cons	6.91121	.2904258	23.80	0.000	6.341986	7.480434
rm_mc_11_rmauthority <-						
ERMVS_1_Organic	.6125727	.0373071	16.42	0.000	.5394522	.6856932
_cons	6.414424	.2704197	23.72	0.000	5.884411	6.944437
rm_mc_20_execendorsement <-						
ERMVS_1_Organic	.7544678	.0260539	28.96	0.000	.7034032	.8055325
_cons	8.341912	.3483314	23.95	0.000	7.659195	9.024629
rm_ra_03_comprehensiveness <-						
ERMVS_1_Organic	.6997398	.0306579	22.82	0.000	.6396514	.7598282
_cons	8.816838	.3676232	23.98	0.000	8.09631	9.537366
rm_rm_09_actionplans <-						
ERMVS_1_Organic	.8225502	.0198388	41.46	0.000	.7836669	.8614336
_cons	7.593315	.3179874	23.88	0.000	6.970071	8.216559
rm_rt_23_bumitigation <-						
ERMVS_1_Organic	.8048887	.0214993	37.44	0.000	.7627509	.8470266
_cons	7.615225	.3188742	23.88	0.000	6.990243	8.240207
rm_mc_19_direction <-						
ERMVS_1_Organic	.8285151	.0193894	42.73	0.000	.7905126	.8665177
_cons	7.379516	.3093384	23.86	0.000	6.773223	7.985808
rm_mc_18_execsponsor <-						
ERMVS_1_Organic	.69344	.0311718	22.25	0.000	.6323444	.7545357
_cons	6.749309	.2838989	23.77	0.000	6.192877	7.30574
rm_fd_22_integration <-						
ERMVS_1_Organic	.8247364	.0196465	41.98	0.000	.78623	.8632427
_cons	7.94655	.3322947	23.91	0.000	7.295264	8.597835

		OIM				
Standardized	**Coef.**	**Std. Err.**	**z**	**P>z**	**[95% Conf.**	**Interval]**
rm_ec_01_riskculture <-						
ERMVS_2_Mechanistic	.784563	.0241339	32.51	0.000	.7372614	.8318647
_cons	7.737335	.3238182	23.89	0.000	7.102663	8.372007
rm_fd_05_policy <-						
ERMVS_2_Mechanistic	.7562333	.0265186	28.52	0.000	.7042577	.8082089
_cons	7.678876	.321451	23.89	0.000	7.048843	8.308908
rm_fd_17_frameworkholistic <-						
ERMVS_2_Mechanistic	.8264941	.0197348	41.88	0.000	.7878147	.8651735
_cons	8.048413	.3364243	23.92	0.000	7.389034	8.707793
rm_ra_04_regularbasis <-						
ERMVS_2_Mechanistic	.7043957	.030543	23.06	0.000	.6445325	.7642589
_cons	7.756285	.3245857	23.90	0.000	7.120109	8.392462
rm_ec_16_understandexternal <-						
ERMVS_2_Mechanistic	.7692575	.0254979	30.17	0.000	.7192826	.8192324
_cons	8.428461	.3518449	23.96	0.000	7.738857	9.118064
rm_cc_21_quality <-						
ERMVS_2_Mechanistic	.6620768	.0339702	19.49	0.000	.5954964	.7286572
_cons	7.554988	.3164363	23.88	0.000	6.934784	8.175192

APPENDIX H:
OUTPUTS OF THE MODIFICATION INDICES (MI) FOR THE CFA OF THE ERMV MODEL

					Standard
Measurement	**MI**	**df**	**P>MI**	**EPC**	**EPC**
cov(e.rm_cc_02_escalation,e.rm_cc_10_relationships)	39.441	1	0.00	.1587387	.3763689
cov(e.rm_cc_02_escalation,e.rm_ci_13_employeesimproving)	9.131	1	0.00	.0881431	.1810599
cov(e.rm_cc_02_escalation,e.rm_ci_14_learnings)	8.036	1	0.00	.0715415	.1708347
cov(e.rm_cc_02_escalation,e.rm_fd_06_embedded)	5.867	1	0.02	-.0441466	-.149096
cov(e.rm_cc_02_escalation,e.rm_fd_07_tailored)	4.371	1	0.04	.0485916	.1260858
cov(e.rm_cc_02_escalation,e.rm_mc_12_mgtcommunication)	9.466	1	0.00	-.0722515	-.1876382
cov(e.rm_cc_02_escalation,e.rm_mc_20_execendorsement)	7.151	1	0.01	-.0563755	-.1614101
cov(e.rm_cc_02_escalation,e.rm_mc_19_direction)	8.008	1	0.00	-.0577806	-.1734087
cov(e.rm_cc_02_escalation,e.rm_fd_22_integration)	16.628	1	0.00	-.0787723	-.2496061
cov(e.rm_cc_02_escalation,e.rm_ec_01_riskculture)	12.183	1	0.00	.0750416	.2129183
cov(e.rm_cc_02_escalation,e.rm_ra_04_regularbasis)	5.354	1	0.02	-.0556785	-.1393537
cov(e.rm_cc_02_escalation,e.rm_ec_16_understandexternal)	23.537	1	0.00	.09856	.2950076
cov(e.rm_cc_02_escalation,e.rm_cc_21_quality)	52.292	1	0.00	.1897835	.4336617
cov(e.rm_cc_10_relationships,e.rm_mc_12_mgtcommunication)	5.009	1	0.03	-.0487474	-.1364896
cov(e.rm_cc_10_relationships,e.rm_rt_23_bumitigation)	5.271	1	0.02	-.0443779	-.1398234
cov(e.rm_cc_10_relationships,e.rm_fd_22_integration)	6.610	1	0.01	-.0460675	-.1573802
cov(e.rm_cc_10_relationships,e.rm_cc_21_quality)	58.923	1	0.00	.1868594	.4603426
cov(e.rm_ci_13_employeesimproving,e.rm_ci_14_learnings)	56.518	1	0.00	.2030941	.4529932
cov(e.rm_ci_13_employeesimproving,e.rm_ec_15_understandroles)	5.362	1	0.02	.0563765	.13929
cov(e.rm_ci_13_employeesimproving,e.rm_ra_03_comprehensiveness)	5.682	1	0.02	-.0547974	-.1429645
cov(e.rm_ci_13_employeesimproving,e.rm_rm_09_actionplans)	8.979	1	0.00	-.0639586	-.1832792
cov(e.rm_ci_13_employeesimproving,e.rm_mc_19_direction)	11.246	1	0.00	-.0732953	-.2054667
cov(e.rm_ci_13_employeesimproving,e.rm_ec_01_riskculture)	16.255	1	0.00	.0927834	.2458995
cov(e.rm_ci_13_employeesimproving,e.rm_ra_04_regularbasis)	5.314	1	0.02	-.0593724	-.1388007
cov(e.rm_ci_13_employeesimproving,e.rm_cc_21_quality)	10.393	1	0.00	.0905674	.1933041
cov(e.rm_ci_14_learnings,e.rm_mc_20_execendorsement)	10.959	1	0.00	-.0646475	-.2009799
cov(e.rm_ci_14_learnings,e.rm_rm_09_actionplans)	15.111	1	0.00	-.0718351	-.2392956
cov(e.rm_ci_14_learnings,e.rm_mc_18_execsponsor)	3.965	1	0.05	-.0505609	-.1200529
cov(e.rm_ci_14_learnings,e.rm_ec_01_riskculture)	10.608	1	0.00	.0648855	.1999029
cov(e.rm_ci_14_learnings,e.rm_fd_05_policy)	16.946	1	0.00	-.0860263	-.2512209
cov(e.rm_ci_14_learnings,e.rm_ra_04_regularbasis)	8.368	1	0.00	-.0644715	-.1752099
cov(e.rm_ci_14_learnings,e.rm_cc_21_quality)	17.972	1	0.00	.1030441	.255668

					Standard
Measurement	**MI**	**df**	**P>MI**	**EPC**	**EPC**
cov(e.rm_ec_15_understandroles,e.rm_fd_07_tailored)	5.207	1	0.02	.044267	.1381571
cov(e.rm_ec_15_understandroles,e.rm_mc_12_mgtcommunication)	20.063	1	0.00	-.0878241	-.2743319
cov(e.rm_ec_15_understandroles,e.rm_mc_08_governance)	14.383	1	0.00	-.0607142	-.237411
cov(e.rm_ec_15_understandroles,e.rm_mc_11_rmauthority)	4.763	1	0.03	-.0573195	-.1306094
cov(e.rm_ec_15_understandroles,e.rm_ra_03_comprehensiveness)	8.683	1	0.00	-.0528204	-.177452
cov(e.rm_ec_15_understandroles,e.rm_rt_23_bumitigation)	4.524	1	0.03	-.0370087	-.1300861
cov(e.rm_ec_15_understandroles,e.rm_mc_18_execsponsor)	4.979	1	0.03	-.0510614	-.1343008
cov(e.rm_ec_15_understandroles,e.rm_ec_01_riskculture)	24.939	1	0.00	.0896439	.3059283
cov(e.rm_ec_15_understandroles,e.rm_fd_05_policy)	9.929	1	0.00	.0593375	.1919471
cov(e.rm_ec_15_understandroles,e.rm_ec_16_understandexternal)	28.533	1	0.00	.0905996	.326172
cov(e.rm_ec_15_understandroles,e.rm_cc_21_quality)	6.177	1	0.01	.0544429	.149631
cov(e.rm_fd_06_embedded,e.rm_mc_20_execendorsement)	3.923	1	0.05	-.027959	-.1229346
cov(e.rm_fd_06_embedded,e.rm_ec_01_riskculture)	4.839	1	0.03	.0317133	.138186
cov(e.rm_fd_06_embedded,e.rm_cc_21_quality)	15.959	1	0.00	-.0701246	-.246079
cov(e.rm_fd_07_tailored,e.rm_mc_12_mgtcommunication)	5.859	1	0.02	-.0485076	-.1486388
cov(e.rm_fd_07_tailored,e.rm_mc_19_direction)	11.255	1	0.00	-.0584687	-.2070426
cov(e.rm_fd_07_tailored,e.rm_fd_22_integration)	5.016	1	0.03	-.0369287	-.138068
cov(e.rm_fd_07_tailored,e.rm_fd_05_policy)	6.859	1	0.01	.0504022	.1599415
cov(e.rm_mc_12_mgtcommunication,e.rm_mc_08_governance)	32.005	1	0.00	.093816	.3601782
cov(e.rm_mc_12_mgtcommunication,e.rm_mc_20_execendorsement)	10.949	1	0.00	.0601548	.203389
cov(e.rm_mc_12_mgtcommunication,e.rm_mc_19_direction)	48.547	1	0.00	.1228865	.4355224
cov(e.rm_mc_12_mgtcommunication,e.rm_fd_22_integration)	3.919	1	0.05	.0330283	.1235905
cov(e.rm_mc_12_mgtcommunication,e.rm_fd_05_policy)	12.561	1	0.00	-.0689691	-.2190463
cov(e.rm_mc_12_mgtcommunication,e.rm_ec_16_understandexternal)	4.762	1	0.03	-.0382575	-.1352281
cov(e.rm_mc_12_mgtcommunication,e.rm_cc_21_quality)	6.897	1	0.01	-.0593956	-.1602744
cov(e.rm_mc_08_governance,e.rm_mc_19_direction)	11.033	1	0.00	.047951	.2127416
cov(e.rm_mc_08_governance,e.rm_fd_22_integration)	8.635	1	0.00	.0401223	.1879459
cov(e.rm_mc_08_governance,e.rm_ec_01_riskculture)	8.087	1	0.00	-.0431579	-.1810242
cov(e.rm_mc_08_governance,e.rm_ec_16_understandexternal)	11.290	1	0.00	-.0481538	-.2130732
cov(e.rm_mc_11_rmauthority,e.rm_mc_20_execendorsement)	11.407	1	0.00	.0822115	.202768
cov(e.rm_mc_11_rmauthority,e.rm_ra_03_comprehensiveness)	10.408	1	0.00	.0800154	.1925271
cov(e.rm_mc_11_rmauthority,e.rm_mc_19_direction)	7.234	1	0.01	-.0633852	-.1638715
cov(e.rm_mc_11_rmauthority,e.rm_mc_18_execsponsor)	44.737	1	0.00	.2117797	.3989412
cov(e.rm_mc_11_rmauthority,e.rm_ra_04_regularbasis)	11.074	1	0.00	.092466	.1993606
cov(e.rm_mc_20_execendorsement,e.rm_rt_23_bumitigation)	5.376	1	0.02	-.0374069	-.1423227
cov(e.rm_mc_20_execendorsement,e.rm_mc_19_direction)	24.600	1	0.00	.0784191	.3064033

					Standard
Measurement	**MI**	**df**	**P>MI**	**EPC**	**EPC**
cov(e.rm_mc_20_execendorsement,e.rm_mc_18_execsponsor)	8.268	1	0.00	.0609843	.1736197
cov(e.rm_mc_20_execendorsement,e.rm_ec_01_riskculture)	3.889	1	0.05	-.0328224	-.1212452
cov(e.rm_ra_03_comprehensiveness,e.rm_rm_09_actionplans)	6.520	1	0.01	.0401303	.1563666
cov(e.rm_ra_03_comprehensiveness,e.rm_ec_01_riskculture)	20.310	1	0.00	-.0763654	-.2751959
cov(e.rm_ra_03_comprehensiveness,e.rm_ra_04_regularbasis)	39.131	1	0.00	.1186255	.3770882
cov(e.rm_rm_09_actionplans,e.rm_rt_23_bumitigation)	48.608	1	0.00	.1065297	.4343008
cov(e.rm_rm_09_actionplans,e.rm_fd_05_policy)	9.922	1	0.00	.0520614	.1953261
cov(e.rm_rm_09_actionplans,e.rm_ra_04_regularbasis)	36.501	1	0.00	.1064326	.3716084
cov(e.rm_rm_09_actionplans,e.rm_cc_21_quality)	10.073	1	0.00	-.0609539	-.1943008
cov(e.rm_rt_23_bumitigation,e.rm_ec_01_riskculture)	4.245	1	0.04	-.0339291	-.1279282
cov(e.rm_rt_23_bumitigation,e.rm_fd_17_frameworkholistic)	12.008	1	0.00	.050179	.2178998
cov(e.rm_rt_23_bumitigation,e.rm_ra_04_regularbasis)	13.626	1	0.00	.0679563	.2260177
cov(e.rm_rt_23_bumitigation,e.rm_cc_21_quality)	9.307	1	0.00	-.0612319	-.1859314
cov(e.rm_mc_19_direction,e.rm_fd_22_integration)	25.986	1	0.00	.0739966	.3199816
cov(e.rm_mc_19_direction,e.rm_fd_05_policy)	6.879	1	0.01	-.0443941	-.1629373
cov(e.rm_mc_18_execsponsor,e.rm_cc_21_quality)	8.731	1	0.00	-.0780204	-.1772725
cov(e.rm_fd_22_integration,e.rm_ec_01_riskculture)	7.010	1	0.01	-.0404356	-.16531
cov(e.rm_fd_22_integration,e.rm_fd_05_policy)	5.677	1	0.02	-.0381506	-.1478393
cov(e.rm_fd_22_integration,e.rm_fd_17_frameworkholistic)	12.303	1	0.00	.0471185	.2218547
cov(e.rm_fd_22_integration,e.rm_ec_16_understandexternal)	11.628	1	0.00	-.0491914	-.2121517
cov(e.rm_ec_01_riskculture,e.rm_ra_04_regularbasis)	12.854	1	0.00	-.0692585	-.2236439
cov(e.rm_ec_01_riskculture,e.rm_ec_16_understandexternal)	24.520	1	0.00	.081613	.3151706
cov(e.rm_fd_05_policy,e.rm_ra_04_regularbasis)	7.517	1	0.01	.0553749	.1694925
cov(e.rm_ra_04_regularbasis,e.rm_cc_21_quality)	9.368	1	0.00	-.071466	-.185851

EPC = Expected Parameter Change

APPENDIX I:

CULTURE DIMENSIONS AND HYPOTHESES

Culture Dimension	Author	Details	Hypothesis	Hypothesis Description	Reasoning Behind Hypothesis	Related ERM Pillars
Uncertainty Avoidance (UAI-H)	*Hofstede*	Measure of a culture's attitudes towards time, future, uncertainty and anxiety and the extent to which the members of institutions and organizations within a society feel threatened by uncertain, unknown, ambiguous, or unstructured situations.- summed up as ambiguity i.e. Ambiguity perturbs members of high UAI cultures	H1	A high UAI-H score will indicate an ERM framework that is central to the company's strategic objectives	High UAI-H societies will fear the ambiguity that comes in taking risks, therefore would emphasise a more mature ERM framework central to the ornaisations's strategic objectives; in effect making risks known and mitigating them.	M&C, FD
Uncertainty Avoidance (UAI-G)	*GLOBE*	A measure of a culture's preference to exist in a structured system stressing formalised procedures, orderliness and consistency	H2	High UAI-G cultures will demonstrate an ERM framework that is well-structured throughout the organisational processes	The greater the UAI-G score, the more likely a culture will wish to gain more control over management of risk, hence a more formalised approach with ERM structured and integrated throughout the organisational processes.	FD, FM&R
Power Distance (PDI-H)	*Hofstede*	Indicates a culture's perceptions on human inequality in domains of prestige, wealth and power and the extent to which the less powerful members of institutions and organizations within a society expect and accept that power is distributed unequally	H3	Cultures scoring high in PDI-H will be emphasise engaging in ERM for reasons of audit/compliance rather than strategic vision	High PDI-H cultures will expect mandates to come from a position of authority and respect these; in the case of ERM these are in the form of corporate governance regulations placed on firms by government	M&C, FD, EC, C&C
Power Distance (PDI-G)	*GLOBE*	This dimension reflects the extent to which a culture accepts and endorses authority, power distances and status privileges.	H4	In a high PDI-G culture, ERM will be pursued via a top-down approach driven by board of directors and senior management	In a high PDI-G culture one would expect that the majority of strategic management issues including ERM will be left to those in a position of authority and seniority i.e. An Ivory Tower / Silo approach to ERM	M&C, EC, FM&R
Performance Orientation (PO)	*GLOBE*	Reflects the extent to which the culture encourages and rewards innovation, high standards and performance improvement i.e. The drive for success	H5	High PO cultures will emphasise means of measuring ERM performance such as KPIs throughout the organisation	One of the best measures of performance in the realm of ERM is through KPIs; one would expect high PO cultures then to emphasise KPIs and more comprehensively implement them than lower PO cultures	FD, RM&R, CI
Future Orientation (FO)	*GLOBE*	A culture's prioritisation of past, present and future - in particular how a culture encourages and rewards future-orientated behaviours such as planning and delaying of gratification	H6	Cultures high in FO will emphasise quantifying risk within the ERM framework	A culture high in FO would reward a future-orientated behaviour such as ERM - sophistication of risk quantification in particular is one of the indicators of a high level of ERM maturity and as such one would expect emphasis thereon to be high in a high FO culture	FD, RA, RT, RM&R
Long Term Orientation (LTO)	*Hofstede*	Long term orientation stands for a society which fosters virtues orientated towards future rewards, in particular adaptation, perserverance and thrift. Short term orientation stands for a society which fosters virtues related to the past and present, in particular respect for tradition, perservation of "face," and fulfilling social obligations	H7	High LTO cultures will emphasise spending time, training and resources on ERM implementation	A culture high in LTO would value future rewards and adaptation of the ERM framework and proactively invest in its future success	M&C, RT, RM&R, FM&R, CI
Monumentalism (MON)	*Hofstede*	Monumentalism stands for a society which rewards people who are metaphorically speaking like monuments: proud and unchangeable. The opposite pole, Self-Effacement, stands for a society which rewards humility and flexibility	H8	Low MON cultures will emphasise continual ERM framework improvement	A culture with a low MON would demonstrate humility and flexibility with regards to managing risk and follow a deferent process of continued analysis and improvement, as opposed to proud, unchangeable high MON cultures which would tend to disregard risk (something not necessarily in their control) and believe the ERM framework in place does not need adaptation	M&C, EC, FM&R, CI
Collectivism 1 (COL)	*GLOBE*	Asseses whether group loyalty is is emphasized at the expense of individual goals, whether the economic system emphasizes individual or collective interests, whether being accepted by other group members is important, and whether individualism or group cohesion is valued more in the society.	H9	High collectivist cultures will emphasise clear communication of the ERM framework and the company's risk appetite to all employees throughout the organisation.	A high collectivist culture will expect all employees of a company to be informed of issues of collective interest such as the ERM framework and risk appetite	M&C, EC, C&C
		Null Hypothesis:		**Culture values as measured by cultural dimensions do not demonstrate a statistically significant relationship with ERM values**		

APPENDIX J:

RELIABILITY SCORES OF GLOBE CULTURE DIMENSIONS BY MAIN CULTURE

Main-Culture	Frequency	Percent	Cumulative
Black	164	52.06	52.06
Coloured	25	7.94	60.00
Indian/Asian	28	8.89	68.89
White	98	31.11	100.00
Total	**315**	**100.00**	

by mc: alpha g_uai_01_re g_uai_16_re g_uai_19_re g_uai_24_re, asis item label

-> mc = Black

Test scale = mean(unstandardized items)

			item-test	item-rest	interitem		
Item	Obs	Sign	corr.	corr.	cov.	alpha	Label
g_uai_01_re	160	+	0.6507	0.3024	.5981106	0.4391	
g_uai_16_re	159	+	0.7083	0.3911	.427053	0.3416	
g_uai_19_re	161	+	0.7539	0.4527	.3090549	0.2660	
g_uai_24_re	161	+	0.3886	0.0545	1.110278	0.6063	
Test scale					.6124044	0.5083	mean(unstandardized items)

-> mc = Coloured

Test scale = mean(unstandardized items)

			item-test	item-rest	interitem		
Item	Obs	Sign	corr.	corr.	cov.	alpha	Label
g_uai_01_re	25	+	0.4129	0.0260	1.072503	0.6269	
g_uai_16_re	25	+	0.7581	0.4490	.2537879	0.2340	
g_uai_19_re	23	+	0.8245	0.6138	.1316667	0.1215	
g_uai_24_re	25	+	0.5429	0.1674	.7500534	0.5146	
Test scale					.5461648	0.4815	mean(unstandardized items)

-> mc = Indian/Asian

Test scale = mean(unstandardized items)

			item-test	item-rest	interitem		
Item	Obs	Sign	corr.	corr.	cov.	alpha	Label
g_uai_01_re	26	+	0.6108	0.1805	1.009866	0.6487	
g_uai_16_re	24	+	0.7482	0.4594	.4071212	0.3260	
g_uai_19_re	23	+	0.8184	0.6124	.2490717	0.2119	
g_uai_24_re	28	+	0.5962	0.1568	.9631803	0.5654	
Test scale					.6474798	0.5296	mean(unstandardized items)

-> mc = White

Test scale = mean(unstandardized items)

item-test	item-rest	interitem			
Item	Obs	Sign	corr.	corr.	cov.	alpha	Label
g_uai_01_re	97	+	0.6996	0.3878	.8192655	0.6204	
g_uai_16_re	97	+	0.8008	0.5801	.5569874	0.4690	
g_uai_19_re	97	+	0.8148	0.6123	.5268471	0.4459	
g_uai_24_re	98	+	0.4394	0.1723	1.319767	0.7199	
Test scale					.8057166	0.6514	mean(unstandardized items)

-> mc = .

Test scale = mean(unstandardized items)

item-test	item-rest	interitem			
Item	Obs	Sign	corr.	corr.	cov.	alpha	Label
g_uai_01_re	11	+	0.8102	0.6384	.7757576	0.4795	
g_uai_16_re	11	+	0.7963	0.5785	.7757576	0.5052	
g_uai_19_re	11	+	0.8487	0.5984	.5909091	0.4859	
g_uai_24_re	12	+	0.2393	0.0107	2.1	0.7869	
Test scale					1.060606	0.6697	mean(unstandardized items)

.

. by mc: alpha g_fo_03_re g_fo_04_re g_fo_08_re g_fo_30 g_fo_31, asis item label

-> mc = Black

Test scale = mean(unstandardized items)

item-test	item-rest	interitem			
Item	Obs	Sign	corr.	corr.	cov.	alpha	Label
g_fo_03_re	160	+	0.6863	0.3543	.3189737	0.3474	
g_fo_04_re	163	+	0.7087	0.4105	.2751905	0.3018	
g_fo_08_re	162	+	0.4420	0.1256	.6159241	0.4909	
g_fo_30	162	+	0.5341	0.2749	.4915365	0.4145	
g_fo_31	164	+	0.4293	0.1284	.6373106	0.5000	

Test scale				.4675102	0.4768	mean(unstandardized items)	
-> mc = Coloured							
Test scale = mean(unstandardized items)							
item-test	item-rest	interitem					
Item	Obs	Sign	corr.	corr.	cov.	alpha	Label
g_fo_03_re	25	+	0.3543	0.0651	.8525	0.6412	
g_fo_04_re	25	+	0.8071	0.6019	.2741667	0.3313	
g_fo_08_re	25	+	0.5430	0.2455	.6411111	0.5643	
g_fo_30	25	+	0.8235	0.6444	.2580556	0.3097	
g_fo_31	25	+	0.4511	0.1558	.7483333	0.6055	
Test scale				.5548333	0.5726	mean(unstandardized items)	
-> mc = Indian/Asian							
Test scale = mean(unstandardized items)							
item-test	item-rest	interitem					
Item	Obs	Sign	corr.	corr.	cov.	alpha	Label
g_fo_03_re	26	+	0.4403	-0.0049	.185073	0.2512	
g_fo_04_re	28	+	0.7714	0.3913	-.1478209	.	
g_fo_08_re	28	+	0.5694	0.1958	.0090108	0.0144	
g_fo_30	27	+	0.4586	0.0739	.093562	0.1324	
g_fo_31	28	+	0.1537	-0.2448	.3394518	0.3867	
Test scale				.0965126	0.1724	mean(unstandardized items)	
-> mc = White							
Test scale = mean(unstandardized items)							
item-test	item-rest	interitem					
Item	Obs	Sign	corr.	corr.	cov.	alpha	Label
g_fo_03_re	98	+	0.6237	0.2604	.4166322	0.5024	
g_fo_04_re	97	+	0.7085	0.4246	.2942528	0.3784	
g_fo_08_re	98	+	0.5206	0.2529	.4790158	0.4871	
g_fo_30	98	+	0.4907	0.2006	.5296294	0.5255	
g_fo_31	98	+	0.5998	0.3680	.4152312	0.4391	

Test scale			.4268163	0.5254	mean(unstandardized items)	
-> mc = .						
Test scale = mean(unstandardized items)						
item-test	item-rest	interitem				
Item	Obs	Sign	corr.	corr.	cov.	alpha	Label
g_fo_03_re	12	+	0.7074	0.4747	2.165481	0.8715	
g_fo_04_re	11	+	0.8926	0.8308	1.914141	0.7877	
g_fo_08_re	12	+	0.9145	0.8394	1.685244	0.7804	
g_fo_30	12	+	0.7535	0.6376	2.33531	0.8381	
g_fo_31	12	+	0.7503	0.5998	2.208696	0.8450	
Test scale			2.060502	0.8559	mean(unstandardized items)	
.						
. by mc: alpha g_pdi_05 g_pdi_13_re g_pdi_26_re g_pdi_27_re g_pdi_34_re, asis item label						
-> mc = Black						
Test scale = mean(unstandardized items)						
item-test	item-rest	interitem				
Item	Obs	Sign	corr.	corr.	cov.	alpha	Label
g_pdi_05	161	+	0.6514	0.3127	.3959706	0.4404	
g_pdi_13_re	163	+	0.7525	0.5092	.2526657	0.2991	
g_pdi_26_re	162	+	0.4703	0.0877	.6696955	0.5890	
g_pdi_27_re	159	+	0.4997	0.2508	.546283	0.4796	
g_pdi_34_re	163	+	0.5822	0.3779	.4601032	0.4199	
Test scale			.4652486	0.5103	mean(unstandardized items)	
-> mc = Coloured						
Test scale = mean(unstandardized items)						

item-test	item-rest	interitem					
Item	Obs	Sign	corr.	corr.	cov.	alpha	Label
g_pdi_05	25	+	0.7234	0.4740	.7038889	0.6115	
g_pdi_13_re	25	+	0.8169	0.6315	.5425	0.5236	
g_pdi_26_re	25	+	0.3776	0.0498	1.280278	0.7955	
g_pdi_27_re	25	+	0.6864	0.5509	.8619444	0.6064	
g_pdi_34_re	25	+	0.7975	0.6755	.6813889	0.5435	
Test scale				.814	0.6793	mean(unstandardized	items)
-> mc = Indian/Asian							
Test scale = mean(unstandardized items)							
item-test	item-rest	interitem					
Item	Obs	Sign	corr.	corr.	cov.	alpha	Label
g_pdi_05	28	+	0.2798	-0.1909	.5783834	0.6365	
g_pdi_13_re	28	+	0.6608	0.3272	.0987363	0.1659	
g_pdi_26_re	28	+	0.6820	0.4066	.0686292	0.1129	
g_pdi_27_re	25	+	0.5983	0.2222	.1682099	0.2684	
g_pdi_34_re	28	+	0.5488	0.3448	.179682	0.2376	
Test scale				.2181627	0.3623	mean(unstandardized	items)
-> mc = White							
Test scale = mean(unstandardized items)							
item-test	item-rest	interitem					
Item	Obs	Sign	corr.	corr.	cov.	alpha	Label
g_pdi_05	98	+	0.6837	0.4675	.4350278	0.5090	
g_pdi_13_re	95	+	0.7590	0.5627	.3558554	0.4555	
g_pdi_26_re	97	+	0.5512	0.1868	.6108225	0.6721	
g_pdi_27_re	95	+	0.4910	0.1352	.662484	0.6831	
g_pdi_34_re	98	+	0.7911	0.6766	.3950822	0.4534	

Test scale				.4920885	0.6149	mean(unstandardized items)
-> mc = .						
Test scale = mean(unstandardized items)						
item-test item-rest interitem						
Item	Obs	Sign	corr.	corr.	cov.	alpha Label
g_pdi_05	12	+	0.8337	0.6332	.3059289	0.4464
g_pdi_13_re	12	+	0.6716	0.4183	.6517787	0.6282
g_pdi_26_re	12	+	0.6485	0.3480	.5635046	0.6200
g_pdi_27_re	11	+	0.7388	0.6148	.6300505	0.5689
g_pdi_34_re	12	+	0.4086	0.3149	.9284585	0.6745
Test scale				.6160658	0.6540	mean(unstandardized items)
.						
. by mc: alpha g_col_07_re g_col_12 g_col_29_re g_col_35_re, asis item label						
-> mc = Black						
Test scale = mean(unstandardized items)						
item-test item-rest interitem						
Item	Obs	Sign	corr.	corr.	cov.	alpha Label
g_col_07_re	158	+	0.6003	0.0699	.0546649	0.0562
g_col_12	158	+	0.4377	-0.0153	.2335352	0.1942
g_col_29_re	159	+	0.5021	0.1187	.001824	0.0016
g_col_35_re	162	+	0.5677	0.0501	.0595121	0.0607
Test scale				.0878498	0.1064	mean(unstandardized items)
-> mc = Coloured						
Test scale = mean(unstandardized items)						

item-test item-rest interitem							
Item	Obs	Sign	corr.	corr.	cov.	alpha	Label
g_col_07_re	25	+	0.4651	0.0783	.435	0.2731	
g_col_12	25	+	0.5691	0.1214	.3161111	0.2281	
g_col_29_re	25	+	0.4705	0.0978	.4	0.2519	
g_col_35_re	25	+	0.6994	0.2339	.0522222	0.0478	
Test scale					.3008333	0.2648	mean(unstandardized items)
-> mc = Indian/Asian							
Test scale = mean(unstandardized items)							
item-test item-rest interitem							
Item	Obs	Sign	corr.	corr.	cov.	alpha	Label
g_col_07_re	25	+	0.7332	0.3799	.1053457	0.1129	
g_col_12	27	+	0.6217	0.3375	.2572222	0.2125	
g_col_29_re	25	+	0.5178	0.1968	.4585589	0.3445	
g_col_35_re	28	+	0.5739	0.1991	.6346287	0.4852	
Test scale					.3615877	0.3667	mean(unstandardized items)
-> mc = White							
Test scale = mean(unstandardized items)							
item-test item-rest interitem							
Item	Obs	Sign	corr.	corr.	cov.	alpha	Label
g_col_07_re	97	+	0.6805	0.2822	.2900489	0.2589	
g_col_12	97	+	0.5576	0.1713	.501787	0.3696	
g_col_29_re	96	+	0.5047	0.1604	.5835161	0.3976	
g_col_35_re	97	+	0.6313	0.2264	.3634111	0.3024	
Test scale					.4349464	0.4050	mean(unstandardized items)
-> mc = .							
Test scale = mean(unstandardized items)							

item-test item-rest interitem							
Item	Obs	Sign	corr.	corr.	cov.	alpha	Label
g_col_07_re	11	+	0.7479	0.4034	1.099198	0.5926	
g_col_12	11	+	0.8208	0.6251	.5727273	0.3737	
g_col_29_re	12	+	0.4477	0.1279	1.765278	0.7289	
g_col_35_re	12	+	0.8025	0.6287	.6121528	0.3663	
Test scale					1.006994	0.6099	mean(unstandardized items)
.							
. by mc: alpha g_po_15_re g_po_18_re g_po_20_re, asis item label							
-> mc = Black							
Test scale = mean(unstandardized items)							
item-test item-rest interitem							
Item	Obs	Sign	corr.	corr.	cov.	alpha	Label
g_po_15_re	157	+	0.7268	0.2245	.625854	0.4673	
g_po_18_re	164	+	0.6974	0.3039	.4256005	0.2754	
g_po_20_re	161	+	0.6536	0.2839	.5727993	0.3412	
Test scale					.5428696	0.4544	mean(unstandardized items)
-> mc = Coloured							
Test scale = mean(unstandardized items)							
item-test item-rest interitem							
Item	Obs	Sign	corr.	corr.	cov.	alpha	Label
g_po_15_re	25	+	0.7771	0.2621	.5362319	0.4522	
g_po_18_re	24	+	0.7938	0.5795	.2216667	0.1530	
g_po_20_re	25	+	0.6228	0.1575	1.094203	0.6586	
Test scale					.6119466	0.5286	mean(unstandardized items)
-> mc = Indian/Asian							
Test scale = mean(unstandardized items)							

item-test item-rest interitem							
Item	Obs	Sign	corr.	corr.	cov.	alpha	Label
g_po_15_re	24	+	0.8912	0.6279	.5740741	0.4800	
g_po_18_re	28	+	0.8206	0.5342	1.090909	0.6006	
g_po_20_re	27	+	0.6626	0.4380	1.853261	0.7276	
Test scale				1.149583	0.7157	mean(unstandardized items)	
-> mc = White							
Test scale = mean(unstandardized items)							
item-test item-rest interitem							
Item	Obs	Sign	corr.	corr.	cov.	alpha	Label
g_po_15_re	95	+	0.7905	0.3811	.8609321	0.6440	
g_po_18_re	98	+	0.7431	0.4610	.8011897	0.4770	
g_po_20_re	97	+	0.7624	0.4983	.762374	0.4462	
Test scale				.8085587	0.6130	mean(unstandardized items)	
-> mc = .							
Test scale = mean(unstandardized items)							
item-test item-rest interitem							
Item	Obs	Sign	corr.	corr.	cov.	alpha	Label
g_po_15_re	11	+	0.7479	0.4558	1.227273	0.6213	
g_po_18_re	12	+	0.8758	0.5075	.6909091	0.5672	
g_po_20_re	12	+	0.7500	0.5140	.9454545	0.4824	
Test scale				.9625668	0.6548	mean(unstandardized items)	

APPENDIX K:
CORRELATION TABLES FOR ERMV CONSTRUCTS & CULTURE DIMENSIONS

Risk_1~c Risk_2~c g_po_agg g_col_~g g_pdi_~g g_fo_agg h_ivr_~g
Risk_1_Org~c 1.0000
163
Risk_2_Mec~c 0.9185 1.0000
0.0000
163 163
g_po_agg -0.0052 -0.0089 1.0000
0.9493 0.9127
153 153 154
g_col_agg -0.0048 -0.0173 0.3352 1.0000
0.9537 0.8340 0.0000
149 149 146 149
g_pdi_agg 0.1006 0.0877 -0.3385 -0.1539 1.0000
0.2175 0.2827 0.0000 0.0656
152 152 147 144 153
g_fo_agg -0.0427 -0.0224 0.4210 0.2785 -0.5127 1.0000
0.5991 0.7826 0.0000 0.0007 0.0000
154 154 149 144 147 155
h_ivr_agg -0.2043 -0.2001 -0.2033 -0.0378 0.0464 -0.0832 1.0000
0.0096 0.0112 0.0123 0.6506 0.5725 0.3063
160 160 151 146 150 153 161
h_lto_agg -0.0122 -0.0406 0.2090 -0.0200 -0.1982 0.1158 -0.1533
0.8782 0.6099 0.0103 0.8110 0.0154 0.1556 0.0545
160 160 150 146 149 152 158

h_uai_agg 0.2086 0.1900 0.1106 -0.0855 -0.2004 0.1604 -0.3662
0.0079 0.0158 0.1751 0.3032 0.0136 0.0476 0.0000
161 161 152 147 151 153 159
h_mas_agg -0.0317 -0.0807 0.0374 -0.1543 0.0360 -0.0609 0.0279
0.6907 0.3104 0.6484 0.0630 0.6622 0.4562 0.7279
160 160 151 146 150 152 158
h_pdi_agg 0.0455 0.0594 0.0115 -0.0036 -0.0765 -0.0223 0.0727
0.5666 0.4542 0.8881 0.9652 0.3504 0.7841 0.3609
161 161 152 147 151 154 160
h_lto_~g h_uai_~g h_mas_~g h_pdi_~g
h_lto_agg 1.0000
160
h_uai_agg 0.1808 1.0000
0.0225
159 162
h_mas_agg 0.0704 0.0496 1.0000
0.3809 0.5349
157 159 161
h_pdi_agg 0.0451 -0.0348 -0.0074 1.0000
0.5724 0.6622 0.9263
159 160 159 162
-> mc = Coloured
Risk_1~c Risk_2~c g_po_agg g_col_~g g_pdi_~g g_fo_agg h_ivr_~g
Risk_1_Org~c 1.0000
25

Risk_2_Mec~c 0.9900 1.0000
0.0000
25 25
g_po_agg 0.4436 0.4534 1.0000
0.0299 0.0261
24 24 24
g_col_agg 0.5566 0.5476 0.3838 1.0000
0.0039 0.0046 0.0641
25 25 24 25
g_pdi_agg 0.2386 0.2069 -0.0893 0.1633 1.0000
0.2506 0.3211 0.6783 0.4353
25 25 24 25 25
g_fo_agg 0.2041 0.2331 0.5809 0.0955 -0.5906 1.0000
0.3277 0.2622 0.0029 0.6499 0.0019
25 25 24 25 25 25
h_ivr_agg -0.0973 -0.1202 -0.4861 0.0407 0.1506 -0.3624 1.0000
0.6589 0.5850 0.0218 0.8537 0.4929 0.0893
23 23 22 23 23 23 23
h_lto_agg 0.3791 0.3511 0.3422 0.1553 0.1309 -0.0235 -0.1289
0.0677 0.0925 0.1100 0.4687 0.5421 0.9132 0.5577
24 24 23 24 24 24 23
h_uai_agg -0.3457 -0.2615 0.7424 0.2151 -0.1719 0.3261 -0.3783
0.1151 0.2398 0.0001 0.3363 0.4444 0.1385 0.0825
22 22 21 22 22 22 22
h_mas_agg -0.1132 -0.1200 -0.2524 -0.3517 -0.1014 0.0007 0.0035
0.5900 0.5677 0.2342 0.0847 0.6296 0.9975 0.9873
25 25 24 25 25 25 23
h_pdi_agg -0.1551 -0.1058 -0.3409 0.1173 0.3445 -0.3839 0.3818
0.4692 0.6227 0.1114 0.5851 0.0993 0.0640 0.0795
24 24 23 24 24 24 22

h_lto_~g h_uai_~g h_mas_~g h_pdi_~g
h_lto_agg 1.0000
24
h_uai_agg 0.3409 1.0000
0.1205
22 22
h_mas_agg -0.1414 0.0195 1.0000
0.5100 0.9315
24 22 25
h_pdi_agg -0.1224 -0.1814 -0.5167 1.0000
0.5779 0.4313 0.0097
23 21 24 24
-> mc = Indian/Asian
Risk_1~c Risk_2~c g_po_agg g_col_~g g_pdi_~g g_fo_agg h_ivr_~g
Risk_1_Org~c 1.0000
28
Risk_2_Mec~c 0.9749 1.0000
0.0000
28 28
g_po_agg 0.0402 0.0440 1.0000
0.8556 0.8418
23 23 23
g_col_agg 0.1049 0.1227 0.1602 1.0000
0.6256 0.5678 0.4878
24 24 21 24

g_pdi_agg 0.0098 0.0184 -0.2411 0.1012 1.0000
0.9630 0.9304 0.2798 0.6379
25 25 22 24 25
g_fo_agg -0.0366 -0.0312 0.3031 -0.3094 -0.5449 1.0000
0.8622 0.8824 0.1818 0.1508 0.0072
25 25 21 23 23 25
h_ivr_agg -0.1929 -0.1969 0.1917 0.2275 0.3701 -0.2730 1.0000
0.3254 0.3152 0.3808 0.2850 0.0686 0.1867
28 28 23 24 25 25 28
h_lto_agg -0.1371 -0.0876 -0.0103 -0.2718 -0.0149 -0.0450 0.1855
0.4952 0.6638 0.9637 0.2097 0.9451 0.8346 0.3543
27 27 22 23 24 24 27
h_uai_agg 0.0107 0.0584 0.2726 0.1539 -0.4138 -0.0483 -0.4090
0.9571 0.7680 0.2083 0.4728 0.0398 0.8187 0.0307
28 28 23 24 25 25 28
h_mas_agg -0.4309 -0.4440 0.1631 -0.0308 -0.4078 0.1270 0.2385
0.0280 0.0231 0.4683 0.8889 0.0479 0.5543 0.2406
26 26 22 23 24 24 26
h_pdi_agg 0.0092 -0.0379 -0.3881 -0.0942 0.4359 -0.3050 0.0201
0.9630 0.8481 0.0673 0.6616 0.0294 0.1381 0.9190
28 28 23 24 25 25 28
h_lto_~g h_uai_~g h_mas_~g h_pdi_~g
h_lto_agg 1.0000
27
h_uai_agg 0.0768 1.0000
0.7034
27 28

h_mas_agg 0.0976 0.0491 1.0000
0.6425 0.8117
25 26 26
h_pdi_agg 0.0868 -0.4551 -0.2691 1.0000
0.6668 0.0150 0.1837
27 28 26 28
-> mc = White
Risk_1~c Risk_2~c g_po_agg g_col_~g g_pdi_~g g_fo_agg h_ivr_~g
Risk_1_Org~c 1.0000
98
Risk_2_Mec~c 0.8887 1.0000
0.0000
98 98
g_po_agg -0.0552 0.0089 1.0000
0.5970 0.9321
94 94 94
g_col_agg -0.1670 -0.1049 -0.0407 1.0000
0.1076 0.3143 0.7014
94 94 91 94
g_pdi_agg 0.1535 0.1339 -0.4631 0.0332 1.0000
0.1464 0.2056 0.0000 0.7576
91 91 88 89 91
g_fo_agg -0.0114 -0.0224 0.4626 -0.1110 -0.4033 1.0000
0.9121 0.8274 0.0000 0.2896 0.0001
97 97 93 93 90 97
h_ivr_agg 0.0023 -0.0499 -0.1155 0.0856 0.0949 0.1166 1.0000
0.9821 0.6275 0.2703 0.4144 0.3738 0.2580
97 97 93 93 90 96 97

h_lto_agg -0.2376 -0.1421 0.2574 -0.0171 -0.1064 0.0699 -0.1685
0.0204 0.1696 0.0138 0.8722 0.3212 0.5034 0.1045
95 95 91 91 89 94 94
h_uai_agg -0.1864 -0.1535 0.0968 0.0238 0.0076 0.0338 -0.1051
0.0662 0.1312 0.3535 0.8201 0.9429 0.7422 0.3055
98 98 94 94 91 97 97
h_mas_agg -0.1012 -0.0881 0.1475 0.0826 -0.1366 0.0341 0.1917
0.3242 0.3909 0.1582 0.4310 0.1993 0.7416 0.0613
97 97 93 93 90 96 96
h_pdi_agg 0.1674 0.1455 -0.1329 0.0462 0.1503 -0.1730 0.1323
0.0995 0.1529 0.2015 0.6586 0.1550 0.0901 0.1965
98 98 94 94 91 97 97
h_lto_~g h_uai_~g h_mas_~g h_pdi_~g
h_lto_agg 1.0000
95
h_uai_agg 0.2053 1.0000
0.0460
95 98
h_mas_agg -0.0125 0.0536 1.0000
0.9050 0.6024
94 97 97
h_pdi_agg -0.1718 -0.2577 0.0232 1.0000
0.0959 0.0104 0.8217
95 98 97 98
-> mc = .
Risk_1~c Risk_2~c g_po_agg g_col_~g g_pdi_~g g_fo_agg h_ivr_~g
Risk_1_Org~c 1.0000

12
Risk_2_Mec~c 0.7776 1.0000
0.0029
12 12
g_po_agg 0.0447 -0.1536 1.0000
0.8961 0.6521
11 11 11
g_col_agg 0.1494 -0.1468 0.6903 1.0000
0.6804 0.6857 0.0271
10 10 10 10
g_pdi_agg -0.3590 -0.2478 -0.4240 -0.3545 1.0000
0.2782 0.4626 0.1938 0.3149
11 11 11 10 11
g_fo_agg -0.0820 -0.2727 0.7226 0.5913 -0.5399 1.0000
0.8105 0.4172 0.0182 0.0718 0.1072
11 11 10 10 10 11
h_ivr_agg -0.4733 -0.2720 0.0649 0.1544 0.4382 -0.0060 1.0000
0.1201 0.3924 0.8497 0.6703 0.1777 0.9861
12 12 11 10 11 11 12
h_lto_agg -0.1828 -0.0353 -0.2062 -0.1196 0.2351 -0.1150 -0.4802
0.5906 0.9180 0.5677 0.7593 0.5131 0.7518 0.1350
11 11 10 9 10 10 11
h_uai_agg 0.4024 0.4097 0.1286 -0.1799 -0.2995 -0.2729 -0.5698
0.2198 0.2108 0.7233 0.6432 0.4005 0.4455 0.0672
11 11 10 9 10 10 11
h_mas_agg 0.1204 0.0266 -0.2019 -0.4335 -0.0674 -0.0665 -0.4004
0.7094 0.9347 0.5517 0.2107 0.8439 0.8459 0.1971
12 12 11 10 11 11 12

h_pdi_agg -0.6675 -0.5726 0.0835 0.4426 0.1437 0.0629 0.3457
0.0248 0.0656 0.8187 0.2329 0.6921 0.8631 0.2977
11 11 10 9 10 10 11
h_lto_~g h_uai_~g h_mas_~g h_pdi_~g
h_lto_agg 1.0000
11
h_uai_agg 0.2983 1.0000
0.3730
11 11
h_mas_agg 0.0008 0.4030 1.0000
0.9980 0.2191
11 11 12
h_pdi_agg 0.2569 -0.2147 -0.3794 1.0000
0.4737 0.5515 0.2499
10 10 11 11