

Toward a Theory of Everything? Exploring at the Edges of the ERM Construct

Abstract:

During the past ten years, enterprise risk management (ERM) has evolved considerably into a 'best practice' approach for identifying, managing and monitoring risk across an entire organization. At the level of theory, ERM standards and frameworks such as COSO and ISO, have provided guidance and a direction forward. Nevertheless, there remains no single, universally accepted ERM framework. At times, the multiplicity of approaches to ERM can produce confusion, leaving companies and practitioners alike wondering which method is 'right'.

Moreover, despite advances in ERM theory and practice, trans-boundary risk, extreme events and emerging risk continue to stretch ERM to its limits. This 'stretching', in combination with other observations regarding the current state of ERM theory and practice, suggest limitations in the ERM paradigm as it exists today. This raises several compelling questions which are the focus of this paper as follows: 1) What is the current state of the ERM paradigm, including its apparent limitations and boundaries and particularly with regard to extreme events and emerging risk?; 2) Is it possible to have a unified ERM "theory of everything", capable of explaining both smaller, localized risk events as well as trans-boundary risk and emerging risk?; 3) Might it be the case that one set of laws applies to localized risk while a separate and different set of laws applies to macro-level risks such as extreme events and trans-boundary risk?

In order to propose answers to these questions, this paper draws from the divergent fields of modern physics and management theory. Concepts taken from physics will include quantum mechanics, general relativity and string theory. Concepts taken from management theory will include systems theory, complexity theory, scenario planning and interdisciplinarity. In combination, these will be suggested as novel means for moving toward a more robust ERM construct.

Key words: ERM, systems theory, complexity theory, scenario planning, interdisciplinarity

Introduction- Background and Purpose

ERM first began to emerge in the early 1990s, and since then, its benefits have been increasingly touted and more companies have sought to implement ERM as a best practice standard. Nevertheless, despite the growth and evolution of ERM during the past two decades, research reveals that relatively few organizations have been successful at implementing ERM and developing their ERM programs to a fully mature state (Gates, 2006; Fraser and Simkins, 2007). These observations suggest a paradox of sorts, where ERM is ‘conceptually straightforward [but] its implementation is not’ (Nocco and Stulz, 2006, p. 8). Moreover, while the benefits of ERM seem intuitive, the value of ERM oftentimes remains difficult to quantify and articulate. Although existing literature suggests numerous anticipated benefits to be derived from ERM, there is scant academic research which demonstrably supports the accomplishments of ERM (Gates, 2006). Combined, these observations suggest the existence of limitations within the current state of ERM theory and practice.

The purpose of this paper is to explore along the boundaries of the current ERM paradigm, in the places where existing theory and practice are seemingly being stretched to their limits. In order to achieve this objective, this exploratory discussion will address the following research questions: 1) What is the current state of the ERM paradigm, including its apparent limitations and boundaries with regard to extreme events and emerging risk?; 2) Is it possible to have a unified ERM “theory of everything”, capable of explaining both smaller, localized risk events as well as trans-boundary risk and emerging risk?; 3) Might it be the case that one set of laws applies to localized risk while a separate and different set of laws applies to macro-level risks such as extreme events

Kathleen Locklear

and trans-boundary risk, and if so, how might those be appropriately incorporated within the ERM construct?

With these questions in mind, this paper will draw from the seemingly disparate disciplines of physics and management theory. By adopting this novel approach, it is hoped that this paper will identify new directions for research and discourse in the areas of ERM and risk management practice. Equally important, it is hoped that this paper will suggest ways in which the ERM paradigm can be enhanced through multi-disciplinary dialogue which transcends the customary, artificial boundaries which exist among various academic and professional disciplines. In seeking to drive this type of dialogue, this paper has been encouraged in considerable part by the writings of Grobstein who noted (2010) that “the task is not to get it right but to get it less wrong, not to disprove existing understandings but to recognize their context-dependence, not to discover what is, but to construct from conflicting understandings previously unconceived alternative understandings.”

This paper begins, in Part One, with an examination of the current state of ERM. This is achieved through a focused literature review which explores how ERM is defined, its frameworks and the current state of ERM practice. The second part of this paper examines certain other limitations (constraints) within ERM. Those limitations are explored through the discussion of several themes that are derived from a review of the literature. Embedded within the discussion of each theme are suggestions regarding particular approaches that are proposed as means for further developing and evolving ERM. Finally, this paper concludes with suggestions for further areas of research.

Part One: Current State of ERM

An exhaustive literature review is beyond the scope of this paper. As such, a more targeted literature review is presented here with the objective of developing an understanding of the current state of ERM. This focused literature review will explore how ERM is currently defined as well as ERM frameworks, standards and practice.

Defining ERM

Enterprise Risk Management (ERM) is a relatively new area within management practice, first appearing in the mid-1990s (Dickinson, 2001, p. 360). The term ‘enterprise risk management’ has been attributed (Iyer, Rogers and Simkins, 2010, p. 437) to usage by James Lam in the mid-1990s. The first academic research on ERM came shortly thereafter with publication of the first research study by Colquitt, Hoyt and Lee in 1999 (Iyer *et al*, p. 421).

Given the relatively limited history of ERM, it is perhaps not entirely surprising that there is no universally accepted definition for *enterprise risk management*. At the level of practice, the array of definitions for ERM can produce confusion, leaving companies questioning what definition is ‘right’. Moreover, with each definition for ERM comes a different set of implementation steps and objectives, resulting in additional ambiguity for companies that wonder if they are correctly implementing ERM. As described in more detail below, the emergence of ERM frameworks and standards have provided means for achieving consistency in how ERM is defined, framed and understood.

ERM Frameworks and Standards

The history of ERM has been marked by the introduction of several standardized frameworks. One of the earliest of these was the Australian/New Zealand Risk Standard which was first introduced in 1995. An updated version of this standard (ASNZ 4630) was subsequently introduced in 2004. The year 2004 also saw the introduction of the COSO Enterprise Risk Management Integrated Framework, published by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). Most recently, in November 2009, the International Organization for Standardization (ISO) published ISO 31000:2009, 'Risk management- Principles and guidelines'.

Despite the development and evolution of these risk management standards and frameworks, there remains no single and universally accepted approach to ERM. It is acknowledged that, by their nature, ERM frameworks need to be general in nature in order to be applicable across a range of industries and sectors. Moreover, ERM frameworks need also to have practical utility and be relatively easy to implement. However, a trade-off of this generality is that in their present form, ERM frameworks are best understood as management heuristics and not as theories which describe the nature of risk. In this regard, ERM frameworks are akin to what Bell (1999, p. 9) describes as “conceptual schema ... not true or false but either useful or not.”

When examining case studies of ERM implementation, it becomes apparent that the experiences of various organizations vary greatly and success rates have remained relatively flat over the past decade. These findings, which are discussed below as part of an exploration of the current state of ERM practice, seem to suggest that a 'one size fits all' approach to ERM does not work. Moreover, it is suggested here that while ERM

frameworks can provide a useful starting point, the task of ERM implementation is both complex and nuanced and therefore requires additional tools and approaches which take into account the objectives and profile of the individual organization. This notion is also raised by Gordon *et al* (2009, p. 303), who comment that ‘the fact that there is no universally ideal ERM system is of course intuitive’. This leads to another theme within the ERM literature which is the adaptive implementation of ERM frameworks by organizations. That is, individuals tasked with ERM implementation are seemingly modifying and coming up with adaptive ERM frameworks which “fit” their organizations and the way in which they view the world order. While certainly practical, and borne out of necessity, this practice leads to fragmentation within ERM and lack of theoretical rigor. It is suggested here that based upon the foregoing, at the present time a satisfactory theoretical, empirical and conceptual understanding of ERM does not currently exist. Carrying this concept a step further, and adapting Kuhn’s definition of *paradigm* to this discussion, it is also proposed here that ERM in its current form does not constitute a universally recognized set of concepts and practices.

ERM Practice

As a relatively new discipline, it is not entirely surprising that there is a dearth of academic research on the topic of ERM. Many of the studies which explore aspects of ERM implementation have been conducted by insurance companies. In 2010, the global insurance giant AON published a report which included findings that only seven per cent of the study respondents had been successful at developing their ERM programs to a mature level, defined (p.3) as being characterized by a ‘well-developed ability to identify measure, manage and monitor risk across the [entire] organization.’ In 2010 the global

Kathleen Locklear

insurance and risk management firm, Marsh, published a study on risk management which included discussion of enterprise risk management. In that study, it was reported (p. 8) that 53 per cent of respondents did not have an ERM program. This number was up considerably from the 27 per cent figure that was reported in 2006.

The results of studies conducted by insurers are consistent with those presented in academic studies. Overall, findings suggest that successful ERM implementation has remained relatively flat since the start of the millennium. For example, research done by Gates in 2006 revealed that only 11 per cent of respondent companies indicated they had ‘fully implemented’ (p. 83) an ERM program. A year later, research by Fraser, One and Simkins (2007) found that only ten per cent of surveyed firms had attained what was deemed to be ‘successful’ ERM implementation (p. 75). Taken together, the data from these studies seems to suggest limitations in existing ERM theory and practice, including the limitations of existing ERM frameworks.

Summary

As identified and discussed in above, there are numerous observable limitations in the current ERM framework. With those noted, discussion turns now to an exploration of possible approaches for advancing ERM theory and practice might be advanced. This exploration will be developed in the next section through the presentation of several *ERM themes*. In sum this discussion seeks to address the question of whether it is possible to have an ERM “theory of everything”.

Part 2- Distilling ERM- Identifying Themes

In addition to the limitations noted in the prior section, ERM remains limited by several other constraints. Those are explored here through the discussion of several *themes* derived from an examination of the literature. Embedded within the discussion of each theme are suggestions regarding particular approaches that are proposed as means for further developing and evolving ERM.

Theme One: ERM as Holistic Approach

Conceptually, ERM is generally understood to involve the holistic management of an organization's portfolio of risks, as those risks exist and interact across the entity as a whole (Lam, 2003; Liebenberg and Hoyt, 2003; Beasley, Pagach and Warr, 2008). This approach differs from traditional risk management where individual risks were customarily handled on a stand-alone, uni-disciplinary basis, leading to a stove-pipe approach to risk management (Beasley and Frigo, 2010, p. 31). Implicit in this distinction, although not consistently articulated across the ERM literature, is the premise that risks are best managed from a portfolio perspective rather than on a stand-alone basis. Adding further to this notion, Power (2009, p. 851) proposes that ERM has been received and "celebrated" as an antidote to the typical siloed approaches of traditional risk management.

However, as it is currently articulated, ERM does not account for the possibility that risks may at once have both small-scale and large-scale aspects such that a combination of both micro and macro approaches is both necessary and optimal. In considering this notion, there are possible corollaries to be gleaned from physics. Specifically, Einstein's theory of General Relativity seeks understanding, on the largest

Kathleen Locklear

scales, at the level of galaxies and clusters. On the other hand, quantum mechanics proposes a theoretical framework for understanding on the smallest scales, at the level of molecules and electrons. Moreover, an ongoing problem within modern physics relates to the inability to reconcile quantum mechanics and general relativity as they are currently formulated. In other words, both theories can not be correct. While each theory works well on its own, both break down when applied in combination, leading to the development of string theory as a means for achieving a harmony (Greene, 2003, p. 3).

Applying this to ERM leads to the important question of whether two separate theories are required: one for large-scale risk (e.g.- global, trans-boundary risk) and another for small-scale risk (localized). And, if such theories are indeed required, then it a further problem which may arise is how (and whether) it is possible to reconcile both. These questions represent not only areas for further research and discourse in ERM, but also seminal questions of epistemology which must be answered in order for ERM to move beyond its current status as a conceptual scheme.

Theme Two: ERM and Interdisciplinarity

There is a general understanding that successful ERM requires a multi-disciplinary approach. This notion is consistent with the idea that ERM seeks to manage the organization's portfolio of risks, across all functional areas of the organization. As described by Fraser *et al* (2007, p. 77), "Currently, there is no single professional group or association that is seen as a clear leader in ERM. [W]hereas professions are usually organized around a single skill set, such as insurance, accounting, actuarial science, or

valuation, ERM requires extensive ongoing input from all these disciplines and from marketing and operations as well.”

In the ERM context, multi-disciplinary teams become essential, since no single discipline or functional area is capable on its own of managing risks which span the entire organization and also external boundaries as well. The requirement for a multi-disciplinary approach distinguishes ERM from traditional risk management, where individual risks (e.g.- credit risk, regulatory risk, environmental safety risk) could be adequately handled on a stand-alone basis by functional experts.

What is not addressed in the ERM literature is how to effectively bring together diverse groups in a way that optimizes the inputs from each group and also ensures that discourse across the groups is harmonized through a shared framework of understanding. In order to move this area of understanding forward, it is useful to consider the literature which addresses *interdisciplinarity*. As defined by Klein and Newell (1997), *interdisciplinary study* can be defined as “a process of answering a question, solving a problem, or addressing a topic that is too broad or complex to be dealt with adequately by a single discipline or profession (p. 394)”. In her 1994 study, Hübenthal posited that interdisciplinary approaches are necessitated when “problems are much too complex to be judged appropriately, let alone be solved, merely with the subject-knowledge of a single discipline” (p. 5). The discussion presented in *Theme One* suggests how insights might emerge through an interdisciplinary approach to ERM.

Theme Three: ERM and Post-Modern Risk

Notions of interconnectedness trans-boundary risk are recurring and embedded as themes within the ERM literature. However, a robust treatment of these topics is lacking

Kathleen Locklear

and as such it is necessary to turn to the scholarly literature in order to arrive at a thorough treatment of these topics.

For example, in the more recent scholarly literature, there has been growing discussion around the proposition that the nature of risk in today's global, interconnected world is materially different (Giddens, 1990; Beck, 1992; Lagadec, 2007; Michel-Kerjan, 2008; Smith & Fischbacher, 2009). In their editorial review (2009) Smith and Fischbacher (2009) echo the evolutionary changes ("shifts") in risk management theory and practice during the past ten years and identify specific "challenges that face academics and practitioners associated with risk management" (p. 2). One specific challenge, relevant here, is the 'borderless' nature of risk, which Smith and Fischbacher describe as the capability of risk to transcend an array of boundaries, both physical and artificial, ranging from geographical to cultural, physical, organizational and academic boundaries.

Globalization is cited as one of the factors contributing to the materially different nature of post-modern risk, which represents a conceptual point of departure (paradigm shift) from antecedent, traditional notions of risk. While risk has historically been viewed as quantifiable, predictable, linear and localized, post-modern risk differs in both its origins and essential nature. Through an understanding of the conditions of the modern environment, including the impact of globalization, it becomes possible to further understand the essence of post-modern risk and why a "new risk architecture" (Michel-Kerjan, p. 821) is required in order to appropriately manage today's risks.

The forces of globalization have been characterized as having radically altered the playing field by creating "globalization of risk" (Tacke, 2001; Giddens, 1990). Beck

(2009) carried this a step further by suggesting a distinction between “old” risks and “new” or “global” risks which he posited are defined by the earmarks of “delocalization, incalculability and non-compensability” (p. 52). Beck’s notion of delocalization captures the idea that the causes and consequences of global risks transcend barriers of geography to involve multiple, dispersed locations, resulting in “omnipresent” risk. Non-compensability captures the notion the destructive impacts of global risks (e.g.- global warming) may not be fixable (through monetary or other compensation), or reversible. Within Beck’s paradigm of global risk, incalculability arises from the “hypothetical” nature of global risk, as well as from conditions of “scientifically generated non-knowing and normative dissent” (p. 52). Here, Beck suggests a condition in which it is not possible to calculate the consequences of global risk or ascertain with certainty if a given risk exists. Incalculability is a challenge as well when seeking to understand emerging risk.

As described by Giddens, globalization involves a “stretching process” (1990, p. 64) in which “the modes of connection between different ... regions become networked across the earth’s surface as a whole [creating] intensification of worldwide ... relations which link distant localities in such a way that local happening are shaped by events occurring many miles away and vice versa.” It is this network of interconnections which provides the pathway through which risk can travel across geographic boundaries, resulting in impacts for both direct and indirect victims. Both tangible and intangible infrastructure are included here, intertwining to create the webs of our “flat” world (Friedman, 2005). As described by Slovic and Weber (2002, p. 12), global risk can create an effect much like that of a stone being dropped into a pond with “ripples that spread

Kathleen Locklear

outward, encompassing first the directly affected victims, then the responsible company or agency, and in the extreme, reaching other companies, agencies and [entire] industries.”

Within the segment of literature which focuses on globalization of risk, a recurring theme is the notion that technological advances, combined with the rapid speed with which they are introduced to the market, make it very difficult to evaluate risk. This difficulty is a byproduct of an environment where “simple cause-and effect relationships are steadily replaced by multi-causal and multi-conditional systems” (Coomber, 2006, p.89). The existence of rapid change, combined with complexity, make it very difficult (and perhaps impossible) to predict a future outcome with certainty.

Although ERM has proposed “process based rules [and frameworks] ... it has “proven to be incapable of articulating and comprehending critical risks, particularly those associated with interconnectedness” (Power, 2009, p. 850). As articulated by Miller (1992) a “significant shortcoming in much of the existing risk and uncertainty literature is the emphasis on particular uncertainties rather than a multidimensional treatment of uncertainty” (p. 312). Systems theory and complexity theory provide means for achieving overcoming this limitation and gaining critical understanding of dynamic interactions among risks. Nevertheless, despite a solid body of literature on the subjects of systems thinking and complexity, there is comparatively little work which applies systems thinking and complexity theory to the subjects of risk management and ERM. White (1995) and Bonabeau (2007) are among the few authors who adopt this focus and as such, there remains a gap in the risk management and ERM literature which needs to be closed in order for ERM to evolve further.

It is further noted here that many risk management and ERM tools are reductionist in nature, premised upon the notion that understanding of an end event (“outcome”) can be derived by “working backwards” to break the event down into its constituent parts. In support of this perspective, White (1995, p. 35) defines systems thinking as “characterized by its holistic approach to problem solving” which she contrasts with “analytical methods used in risk assessment [that] can be viewed mainly as reductionist.” A critical limitation of reductionism is that it neglects to properly acknowledge that modern risk is the byproduct of emerging, complex and systemic factors which are influenced by human behavior.

When examining dynamic risk, including emerging risk, that arises from these conditions, it is necessary to understand that the outcome (‘event’) may be greater than the sum of its constituent elements. This concept is captured eloquently by Grobstein (2007) who notes that, “simple things interacting in simple ways can yield surprisingly complex outcomes”. Thus, in order to understand dynamic risk, it becomes necessary to work “both downward and upward” (Grobstein) in order to capture not only the constituent elements of risk, but also the complexity generated by their dynamic interactions within the context of a given system. As noted by Fulmer (1992) systems thinking offers a valuable tool for removing artificially constructed barriers between constituent parts of a system. By exploring the structure of an entire system, interconnections and interdependencies among constituent elements become visible, thereby uncloaking the nature of risks as revealed through the totality of its individual elements and their dynamic interactions. It is these types of thinking approaches --which

emphasize multi-directional possibilities within a system-- that should be adapted for inclusion within ERM.

Theme Four: ERM and Outlier Events

Despite advances in ERM tools, organizations continue to face challenges and be caught off guard by extreme events and disasters. Focusing specifically on “never” events, Taleb (2007) put forth the “Black Swan” as a particular type of disaster, the essential qualities of which are extreme impact, rarity and a low degree of predictability. Because Taleb situates the Black Swan within the realm of the unpredictable, it is more productive to adjust to the existence of these rare events, rather than continuing efforts to predict them. A seminal characteristic of the Black Swan is that we behave as though it does not exist. This leads us to continue “operating under the false belief that [predictive] tools” (Taleb, p. xviii) are capable of accurately predicting uncertainty. This dynamic in turn leads us to devise tools which provide measurements that ostensibly exclude the possibility of the Black Swan. Within Taleb’s paradigm, that which is unknown is much more relevant than that which is known.

Applying these notions to ERM, it is suggested here that a more productive approach --however counterintuitive--may involve pursuing the unknown. In order to proceed in this way it is first necessary to radically re-frame the manner in which risk problems are approached. This involves considering that lack of knowledge about modern risk may not be merely a ‘knowledge gap’ which can be filled by gathering more information, but rather, that the nature of modern risk makes it impossible *a priori* to have perfect knowledge or risk. Through acceptance of this epistemic limitation, (*a priori* unknowability and incalculability) it is possible to re-focus efforts in other areas

which may prove more productive in terms of identifying ways to address risk from a practical perspective. ERM can --and should be-- further developed to include tools and approaches for addressing types of risk (including Black Swans and emerging risk) which are unknowable or imperfectly knowable (a priori). In doing so, it would become possible to move incrementally forward to states of greater information and actionable knowledge.

Of course, this suggestion leads to the question of how organizations might go about exploring unknown aspects of risk in a meaningful way. One possible approach is through application of scenario planning. As discussed in more detail below, scenario planning provides a means for identifying and describing a range of possible future outcomes. Once this range of possible future outcomes has been articulated, it then becomes possible to better understand sources of emerging risk and to develop contingency plans which might minimize the impact of an emerging risk.

This application of scenario planning is consistent with the premise that traditional decision making strategies (including their applications in the risk management field) have been heavily reliant upon a core set of “rational assumptions” (Allen, 2000) which increasingly do not hold true in today’s complex and dynamic environment. It can no longer be assumed that businesses know all of their options and can therefore rationalize, through a linear process, to identify a single choice that is perfectly aligned with strategic goals and considers risks which might jeopardize those goals. As Ormerod described, (2005, p. 13), “firms certainly act with purpose and intent, and have no intention of failing, but the complexity of the environment in which they are operating means that it is as if they were operating much closer to the zero intelligence

particle model of agent behavior than to that of the fully rational agent”. In subsequent writing (2010), Ormerod further elaborated on this point, adding that individuals have an “inevitably imperfect” understanding of the world. By discarding the “assumption of full information”, and opening the door to the notion of bounded rationality, it becomes possible to explore tools such as scenario planning which offer meaningful potential if effectively incorporated within ERM.

Part Three: Summary and Conclusion

As discussed in this paper, ERM has evolved considerably in the past two decades since its emergence. Nevertheless, there is no single, universally accepted definition for ERM and at the practice level, implementation is adaptive. Moreover, although ERM standards and frameworks have practical use, organizations continue to struggle with the question of whether they are correctly implementing ERM. So, while ERM remains a useful management heuristic, it has not evolved to the level of a paradigm and is not capable in its current state of providing a “theory of everything”.

In order to enhance the robustness of the ERM framework, further study is suggested around the question of whether separate rules are needed to explain and handle localized risk (micro level) and trans-boundary risk (macro level). A related area for further research is how to adapt ERM so that it is able to provide a means for addressing especially problematic types of risk, such as Black Swan events. In seeking to address these areas of study, a further challenge (which is itself an area for further research) is how to effectively bring together multidisciplinary groups which are capable of producing novel research related to ERM. Within this paper, systems theory and

Kathleen Locklear

complexity theory have been identified as means for approaching the challenges of modern risk. However, there is scant research which applies these topics to ERM and as such, this gap in research is yet another area where further study is suggested.

References

Allen, P. (2000). Harnessing complexity. Retrieved February 12, 2010, from http://www.complexity-society.com/papers/harnessing_complexity.pdf

AON. (2010) *Global enterprise risk management survey*. Available from: <http://www.insight.aon.com/?elqPURLPage=4889>, accessed 1 November 2010.

Beasley, M.S. and Frigo, M.L. (2010) ERM and its role in strategic planning and strategy execution. In: J. Fraser and B.J. Simkins (eds.) *Enterprise risk management: Today's leading research and best practices for tomorrow's executives*. Hoboken, NJ: John Wiley & Sons, Inc, pp. 31-50.

Beasley, M.S., Pagach, D. and Warr, R. (2008) Information conveyed in hiring announcements of senior executives overseeing enterprise-wide risk management processes. *Journal of Accounting, Auditing and Finance* 23(3): 311-332.

Beck, U. (1992). *Risk society: Towards a new modernity*. New Delhi: Sage.

Beck, U. (2009). *World at risk*. Polity Press: Cambridge

Bell, D. (1999). *The coming of a post-industrial society- A venture in social forecasting*. New York: Basic Books.

Bonabeau, E. (2007). Understanding and managing complexity risk. *MIT Sloan Management Review*, 48(4): 62-68.

Coomber, J.R. (2006). Natural and Large Catastrophes- Changing Risk Characteristics and Challenges for the Insurance Industry. *Geneva Papers on Risk and Insurance- Issues and Practice*, 31(1): 88-95.

Dickinson, G. (2001, July) Enterprise risk management: Its origins and conceptual foundation. *The Geneva Papers on Risk and Insurance*, 26(3): 360-366.

Fraser, J.S. and Simkins, B.J. (2007) Ten common misconceptions about enterprise risk management. *Journal of Applied Corporate Finance*, 19(4): 75-81.

Friedman, T.L. (2005). *The world is flat: A brief history of the twenty-first century* (1st ed.). New York, NY: Farrar, Straus and Giroux.

Fulmer, R.M. (1992). Nine management development challengers for the 1990s. *The Journal of Management Development*, 11(7): 4-10.

Kathleen Locklear

Gates, S. (2006) Incorporating strategic risk into enterprise risk management: A survey of current corporate practice. *Journal of Applied Corporate Finance*, 18(4): 81-90.

Giddens, A. (1990). *The consequences of modernity*. Stanford, CA: Stanford University Press.

Gordon, L.A., Loeb, M.P. and Tseng, C.Y. (2009) Enterprise risk management and firm performance: A contingency perspective. *Journal of Accounting and Public Policy*, 28: 301-327.

Grobstein, P. (2007). From complexity to emergence and beyond: Towards empirical non-foundationalism as a guide for inquiry. *Soundings*, 90(1/2): 301-323.

Grobstein, P. (2010, March 26). Education in the evolving systems context. Retrieved from <http://serendip.brynwarw.edu/exchange/evolsys/home>

Greene, B. (2003). *The elegant universe*. New York: Vintage Books.

Hübenthal, U. (1994) Interdisciplinary thought. *Issues in Integrative Studies*, 12:55-75.

Iyer, S.R., Rogers, D.A. and Simkins, B.J. (2010) Academic research on enterprise risk management. In: J. Fraser and B.J. Simkins (eds.) *Enterprise risk management: Today's leading research and best practices for tomorrow's executives*. Hoboken, NJ: John Wiley & Sons, Inc., pp. 419-431.

Klein, J.T. and Newell, W. (1997) Advancing interdisciplinary studies. In : J. Gaff and J. Ratcliff (eds.) *Handbook of the undergraduate curriculum: A comprehensive guide to purposes, structures, practices, and changes*. San Francisco: Jossey-Bass, pp. 393-415.

Lagadec, P. (2007). Over the edge of the world. *Crisis Response Journal*, 3(4): 48-49.

Liebenberg, A.P. and Hoyt, R.E. (2003) The determinants of enterprise risk management: Evidence from the appointment of chief risk officers. *Risk Management and Insurance Review*, 6(1): 37-52.

Marsh. (2010) *Excellence in risk management VII- Elevating the practice of strategic risk management*. Available from: http://www.marsh-africa.com/documents/MarshExcellenceinRiskManagementReport_April2010.pdf.

Michel-Kerjan, E.O. (2008). Toward a new risk architecture: The question of catastrophe risk calculus. *Social Research*, 75(3): 819-854.

Miller, K.D. (1992). A Framework for Integrated Risk Management in International Business. *Journal of International Business*, 23(2): 311-331.

Kathleen Locklear

Nocco, B.W. and Stulz, R.M. (2006). Enterprise risk management: Theory and practice. *Journal of Applied Corporate Finance*, 18(4): 8-20.

Ormerod, P. (2005). *Why most things fail: Evolution, extinction and economics*. New York: Pantheon Books.

Power, M. (2009). The risk management of nothing. *Accounting, Organizations and Society*, 34: 849-855.

Smith, D., & Fischbacher, M. (2009). The changing nature of risk and risk management: The challenge of borders, uncertainty and resilience. *Risk Management*, 11, 1-12. Retrieved November 20, 2010, from <http://www.palgrave-journals.com/rm/journal/v11/n1/full/rm20091a.html>

Tacke, V. (2001). BSE as an organizational construction: A case study on the globalization of risk. *British Journal of Sociology*, 52(2): 293-312.

Taleb, N. N. (2007). *The black swan*. New York, NY: Random House.

White, D. (1995). Application of systems thinking to risk management. *Management Decision*, 33(10): 35-45.