

Defining Risk in Management Research

Jonas Stromfeldt Eduardsen, Svetla Trifonova Marinova, Oded Shenkar, Simcha Ronen

March 2, 2018

A major problem in the field of management has been the wide variety of definitions that have been proposed. To resolve the resulting terminological confusion, a conceptual review that considers the many ways in which risk has been defined in the management literature was conducted. Our findings highlight some disagreement in the management literature associated with the definition of risk. The review identified four distinct groups of risk definitions: (1) risk as outcome uncertainty, (2) risk as probability of (unwanted) outcomes, (3) risk as variability in outcomes, and (4) risk as unwanted outcomes (that may or may not occur).

Introduction

Risk is an inherent characteristic of strategic decision-making and occupies a prominent position in both management research and business practice (Gephart, Van Maanen, & Oberlechner, 2009; Hardy & Maguire, 2016; van der Vegt, Essens, Wahlstrom, & George, 2015). The theme of risk and risk management is by no means new to the management literature. For the past several decades, management scholars have pursued various interesting lines of inquiry, including how risk is related to organizational performance (Andersen & Bettis, 2015; Andersen, Denrell, & Bettis, 2007; Bloom & Milkovich, 1998), why firms engage in risk-taking (A. Chatterjee & Hambrick, 2011; Li & Tang, 2010; Sitkin & Pablo, 1992; Wiseman & Gomez-mejia, 1998), the role of risk in strategic decision-making (Blake & Moschieri, 2017; A. Pablo, Sitkin, & Jemison, 1996; Schwens, Eiche, & Kabst, 2011) and how organizations can effectively manage risk (Das & Teng, 1998; Feinberg & Gupta, 2009; K. D. Miller, 1998). Risk is also an important concept in various management theories, including agency theory (Eisenhardt, 1989; Fama & Jensen, 1983; Jensen & Meckling, 1976) and transaction cost theory (Williamson, 1996; Geyskens, Steenkamp and Kumar, 2006; Hill 1990). For example, a central theme in the voluminous research on agency theory in management research has focused on how firms can reduce agency risks, by using various strategies, such as aligning the interests of the agent and principal using incentives and compensation (Palmer & Wiseman, 1999) or monitoring mechanisms (Autio, Sapienza, & Almeida, 2000). Risk is also a central concept in transaction cost theory, which is based on the central assumption that many transactions involves a risk of opportunism (i.e. a

probability of being exploited by one's exchange partner) and discusses how this risk can be minimized by employing different governance forms (Hill, 1990; Williamson, 1985).

Although these studies have unquestionably advanced our understanding of risk and risk management, their findings have also been questioned because of skepticism regarding the appropriateness of how risk is conceptualized and measured. It has even been argued that risk is likely to be "*one of the most commonly abused concepts in social science, and researchers often depart significantly in their constructs of risk*" (Das & Teng, 2001, p. 517). While risk has been studied for more than four decades, risk remains somewhat of a contested concept about which there remains little consensus about the meaning and measurement (Bromiley, Rau, & Zhang, 2017; K. D. Miller & Reuer, 1996; Ruefli, Collins, & Lacugna, 1999). Bromiley, Rau and Zhang (2017), for example, notes how the concept of risk is used to refer to both firm preferences, behaviors, actions, and outcomes. This has been a major source of confusion and has allegedly constrained the advancement of the field (Palmer & Wiseman, 1999). Scholars have also voiced their concerns about how risk has been conceptualized in the management literature (K. D. Miller, 2009; K. D. Miller & Leiblein, 1996; Ruefli et al., 1999; Thomas & Baird, 1990) and argued that existing conceptualizations of risk are inadequate for capturing the complexity of the concept (Andersen, Garvey, & Roggi, 2014; Hardy & Maguire, 2016). For example, existing research has been criticized for conceptualizing risk in terms of probabilistic outcomes (K. D. Miller, 2009) and relegating risk to the status of unintended consequences (Gephart et al., 2009). Treating risk as an objective and externally measurable constructs can be problematic, as it will cause managers to ignore unexpected and uncertain events that they are unable to attach numbers and reduce risk management to the minimization of unwanted outcomes (Andersen et al., 2014). As a consequence, it has been argued that management scholars must reexamine the assumptions of current risk research and challenge the "dominant discourse" in order to embrace the complexity of the concept (Gephart et al., 2009; Hardy & Maguire, 2016; K. D. Miller, 2009). Thus, despite several years of research on risk, there is still no common definition among management scholars.

The aim of this article is to review the definition and meaning of risk in extant management research. This is achieved by using automated content analysis. First, we present the methodology used in this study, including how we have gathered and analyzed definitions of risk. Second, we examine how risk has been defined and conceptualized within extant management research. Third, we discuss how management scholars can learn from an interdisciplinary view of risk and how this can provide a foundation for promising future research and ultimately lead to more complete and encompassing management research.

Different risk perspectives

While risk has been studied for more than four decades, risk remains somewhat of a contested concept about which there remains little consensus about the meaning and measurement (Bromiley et al., 2017; K. D. Miller & Reuer, 1996; Ruefli et al., 1999). Consequently, different perspectives on risk exist concurrently. For example, some use risk to refer to uncertainty of outcomes, actions and events, while others use risk as a measure of the probability and severity of adverse effects.

While risk is a well-studied and widely used concept in various disciplines, there is no agreed definition of risk. In a recent cross-disciplinary review, Samson, Reneke and Wiecek (2009) surveyed the literature to explore how risk has been conceptualized in different disciplines. They conclude that there are different perspectives on the relationship between risk and uncertainty. While some definitions treat risk as uncertainty, other definitions see risk and uncertainty as different concepts that can be either dependent or independent. Aven (Aven, 2012) also identified distinct categories of risk definitions, including conceptualizing risk as expected value/loss, probabilities, uncertainty, possibility of loss, or consequences.

Thus, the task of defining risk is often fraught with both controversy as well as confusion (Chiles & McMackin, 1996; Palmer & Wiseman, 1999). Risk has been treated and conceptualized differently in various disciplines (Scott & Walsham, 2005; Zinn, 2008). In fact, the conceptualization of risk has been so heterogeneous across different disciplines, that there is hardly any connection between the different conceptualizations. Economists tend to view risk as measurable uncertainty (F. H. Knight, 1921; Runde, 1998; Scott & Walsham, 2005). Psychologists commonly see risk as a behavioral and cognitive phenomenon that is subjectively perceived by individuals (Slovic, 2006; Slovic, Finucane, Peters, & MacGregor, 2004). Psychological literature on risk thus often focuses on identifying mental strategies or heuristics that influence risk perceptions (e.g. Tversky & Kahneman, 1974). Sociologists, in contrast, understand risk as a socially embedded and socially constructed phenomenon and focuses on how risk identification, evaluation, management and social meaning are shaped by structural and institutional contexts (Clarke & Short, 1993; Taylor-Gooby & Zinn, 2006; Tierney, 1999). Thus, there is little consensus regarding how risk should be defined.

Research Methodology

Definitions can be “considered as sections of text, which are amenable to deconstruction into component attributes, which can be categorized and counted” (Baregheh, Rowley and Sambrook, 2009, p. 1327).

Gathering definitions

The first step in our analysis was to identify relevant articles. As it is impossible to present and discuss all definitions of risk suggested and used in the management literature, we identified relevant articles by reviewing premier management journals, including Academy of Management Journal, Academy of Management Review, Strategic Management Journal, Organization Science, Journal of Management Studies, Administrative Quarterly Science, and Journal of Management. We limited ourselves to these journals, as these were the highest ranked management journals according to Scimago Journal Ranking. Like White, Guldiken, Hemphill, He and Khoobdeh (2016), we conducted a keyword search to retrieve relevant articles. As the focus of this article is risk, we searched for articles that included the word risk in the title, abstract or keyword. In total, this search process identified 147 articles relevant to our study. Limiting ourselves to only include articles where the term “risk” appears in the title, abstract or keywords may result in the exclusion of relevant studies. For example, many different synonyms have been used to refer to risk, including uncertainty (REFERENCES) and hazards (Jia & Mayer, 2017; Khoury, Junkunc, & Mingo, 2012). However, others argue that these should not be considered as synonyms for risk, but instead theoretically different concepts. Thus, we constrained ourselves to focus only on the term “risk”.

As illustrated in Figure 1, there has been a significant increase in the number of articles on risk published in management journals from 1968 through 2017. More than half of the identified studies were published from 2000 and onwards, while less than 20 % of the identified articles were published before 1990.

Table 1 also demonstrates that Academy of Management Journal and Strategic Management Journal are the two most dominant outlets for risk related management research, publishing 33 % and 24 % of the articles in our sample, respectively. Thus, articles published in these two journals accounted for more than half of all identified articles.

Figure 1: No. of Risk articles published from 1969-2017 in top management journals

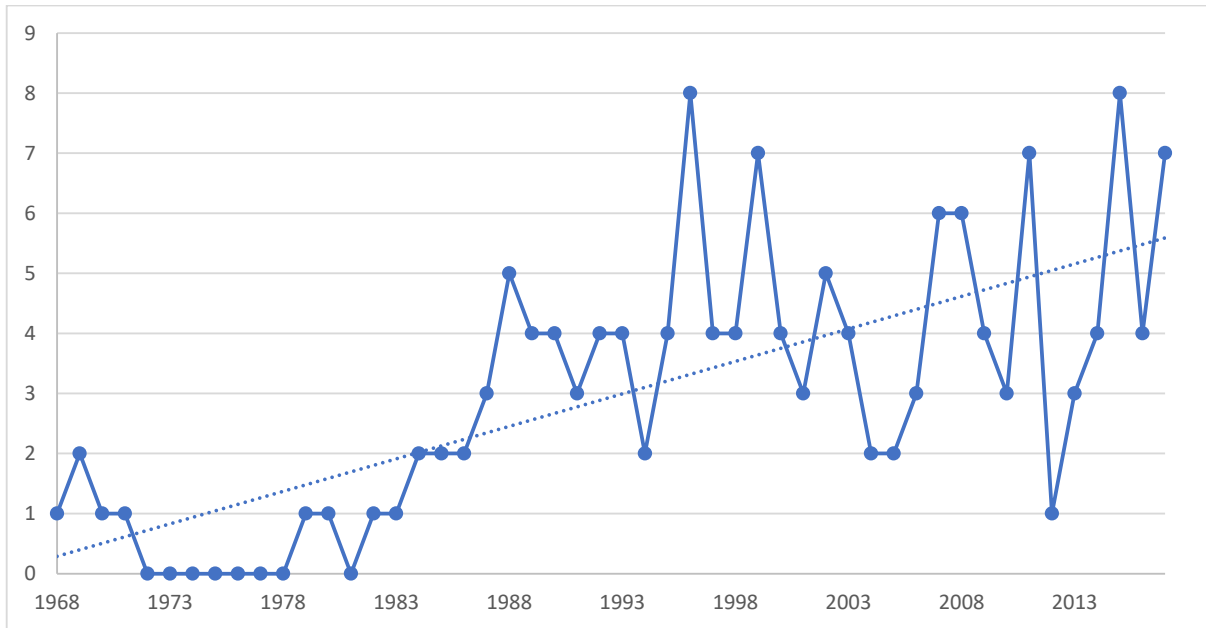


Table 1: Distribution of articles across journals (1969-2017)

Journal name	# of articles	% of articles	Cumulative %
Academy of Management Journal	48	33 %	33 %
Strategic Management Journal	36	24 %	57 %
Organization Science	19	13 %	70 %
Academy of Management Review	13	9 %	79 %
Journal of Management Studies	13	9 %	88 %
Administrative Science Quarterly	10	7 %	95 %
Journal of Management	8	5%	100 %

Since the purpose of this study is to explore how risk has been defined in management research, the manifest definitions of risk were our unit of analysis. Thus, we reviewed all the identified articles in detail to identify and extract explicit definitions of risk. Each time an explicit definition of risk was encountered, it was entered into a database. Thus, we compiled a list of authors, who proposed definitions of risk. Because definitions are often carefully worded, we kept the original wording to avoid any misinterpretation. In total, 86 definitions were identified and extracted from our review of the literature. This also demonstrates how 'risk' was often not explicitly defined in the identified articles.

Analysis

Content analysis is “*a class of methods at the intersection of the qualitative and quantitative traditions*” (Duriau, Reger, & Pfarrer, 2007, p. 5). It is a method for systematically describing the meaning of textual data (Schreier, 2013). Thus, content analysis can be used to make valid inferences from qualitative textual data (Weber, 1990)

The aim of our study was to examine how management research defines risk and to categorize these different definitions of risk based on similarities. Given the purpose of the study, we decided to use text clustering for analyzing the definitions. Text clustering is a text mining technique that involves the application of cluster analysis to textual documents. The aim of text clustering is therefore to organize “*text in groups such that documents belonging to the same group are similar and documents from different groups are not*” (Kobayasho et al., 2017, p. 12). Text clustering therefore allows us to cluster definitions of risk based on similarities in content to identify different categorical groupings of definitions (Evans & Aceves, 2016, p. 13). To prepare the identified definitions of risk for analysis, all definitions were imported into NVivo 11. This allowed us to clear the data, by removing stop words before the actual analysis. This was done to eliminate words that have low information content and add little meaning in the text, as this may confuse the classification of definitions (Kobayasho et al., 2017).

After all definitions were preprocessed, we analyzed them by using NVivo 11 to conduct the actual cluster analysis. Definitions were clustered by word similarity, using Pearson correlation coefficient as a measure of similarity. This involved calculating a similarity index between each definition and grouping definitions together using the complete linkage (farthest neighbor) hierarchical clustering algorithm. Thus, definitions that have more similarity, based on the occurrence and frequency of words are clustered together, while definitions that have a lower degree of similarity are displayed further apart.

Findings

Description of risk definitions

First, following Krippendorff (2016), we analyzed the risk definitions in order to provide a description of the text using word frequencies. Word frequencies are the most appropriate form of content analysis for text-based data in the early stages (Bazeley, 2013) and can be considered an indicator of importance

(Abrahamson & Hambrick, 1997). Word frequencies can be used to gain a broad overview of the frequency with which individual words were being used in defining risk.

Table 2: Word frequencies

Word	Count	Weighted Percentage (%)	Similar Words
outcomes	52	8,52	consequence, consequences, effect, event, events, outcome, outcomes, result, resulting
firm	22	3,83	firm, firms, firms', hard
potential	22	3,83	possibility, possible, potential, potentially
uncertainty	19	3,30	uncertain, uncertainties, uncertainty
returns	15	2,61	return, returns
probability	14	2,35	chances, probabilities, probability
decision	12	2,09	decision, decisions
affect	15	1,91	affect, affecting, affects, impact, involve, involves, involving, manner, moves, regarding
associated	11	1,91	associate, associated
loss	11	1,91	loss, losses
variability	16	1,83	variability, variance, variances, vary, varying
actions	11	1,80	actions, activities, processes
variance	13	1,65	variance, variances, variation
expected	9	1,48	expectations, expected, large, requirements
performance	10	1,45	function, operational, performance
choice	7	1,22	choice, choices, option, selection
likelihood	7	1,22	likelihood, likelihoods
earnings	12	1,13	earnings, gaining, gains, profit, profits, realization, realizations, realized
hazard	7	1,13	chances, hazard, jeopardize, venture, venturing
Negative	6	1,04	Negative, negatively

Table 2 indicates the relative frequencies of words in the risk definitions. As revealed in Table XX, high frequency words used in defining risk includes words such as “outcome”, “potential”, “uncertainty”, “returns”, “probability”, “choice/decision”, “probability/likelihood”, “loss” and “variability/variance”.

The most frequently used word in defining risk is outcome (including synonyms such as consequences, events, results). This demonstrates how risk is typically considered a decisional phenomenon that related to the end result that follows from managerial decision-making or actions. Thus, it can be said that risk involves an attempt to bring the future into the present (Scheytt, Soin, Sahlin-Andersson, & Power, 2006). Our analysis also demonstrates how risk definitions are closely related to potentiality, that is, events or outcomes that may or may not occur. Thus, risk is related to the multitude of ‘future presents’, which may eventually emerge as the actual present. For example, a decision-maker may decide to expand to a new

market. However, it is unclear whether such an expansion will lead to growth and increased profitability or reduced financial performance. Because of this potentiality, the outcome of managerial decision-making and actions appears uncertain, as it is unknown which of the future 'presents' that will occur. Thus, potentiality and uncertainty go hand in hand. This suggests, that most risk definitions in management considers risk to be related to situations, where the outcome is uncertain.

Another commonly used word in defining risk is 'variance/variability'. The term 'variance' is generally used in two separate ways in the risk definitions. Some use variance to refer to the dispersion of possible outcomes from a given decision, while others use it to refer to the volatility of company performance (e.g. Return on assets). For example, Kacperczyk, Beckman and Moliterno (2015) defines risk as "*variation in the distribution of possible outcomes and uncertainty associated with gains and losses*", while Chatterjee, Lubatkin and Schoenecker (1992, p. 139) defines risk as "*variability of returns*". Using variance to refer to the dispersion of possible outcomes from a given situation implies that risk is related to the number of possible outcomes, that is, the number of possible 'future presents'.

Different risk perspectives in management research

A closer inspection of the risk definitions found in the management literature, however, suggests that there is no single agreed upon definition of risk. Rather, as illustrated in

Table 3, four distinct groups of risk definitions were found: (1) risk as outcome uncertainty, (2) risk as probability of (unwanted) outcomes, (3) risk as variability in outcomes, and (4) risk as unwanted outcomes (that may occur). These definitions differ in terms of whether they consider risk to be a situational characteristic or an actual outcome. Furthermore, these definitions differ in terms of whether they define risk as an ex-ante or ex-post phenomenon. Thus, it appears that some disagreement exists in the management literature associated with the definition of risk. In the following, each risk perspective will be discussed in greater detail.

Table 3: Examples of different risk definitions in management literature

Risk perspectives	Examples
Risk as outcome uncertainty	<ul style="list-style-type: none"> • “unpredictability in decision outcomes” (Das and Teng, 2001) • “uncertainty about outcomes or events, especially with respect to the future” (Bloom and Milkovich (1998) • “the extent to which there is uncertainty about outcomes” (Gray and Cannella Jr., 1997) • “the extent to which there is uncertainty about whether potentially significant and/or disappointing outcomes of decisions will be realized” (Sitkin and Pablo, 1992)
Risk as probabilities	<ul style="list-style-type: none"> • “Likelihood that unintentional mistakes and/or intentional distortions, misrepresentations and misdeeds may cause large-scale (material) misstatements in a client’s financial statements” (Schick & Ponemon, 1993, p. 93) • “Probability that a loss will result from a given option” (Wiseman & Gomez-mejia, 1998) • “Situations in which both outcomes and their probabilities of occurrences are known to the decision maker” (Holmes, Bromiley, Devers, Holcomb, & McGuire, 2011) • Perceived probabilities of different future outcomes (Woo, 1987, p. 150) • Likelihood of adverse outcomes and the magnitude of potential loss (Lehman, Hahn, Ramanujam, & Alge, 2011)
Risk as variance/variability	<ul style="list-style-type: none"> • “distribution of possible outcomes from a choice” (Wright, Westhead, & Ucbasaran, 2007) • “Variance of a firm’s return over time” (Figenbaum & Thomas, 1986) • “Variation in the distribution of possible outcomes and uncertainty associated with gains and losses” (Kacperczyk, Beckman and Moliterno, 2015) • “Variability in a firm’s stock price associated with events that primarily affect only that firm” (Bansal & Clelland, 2004) • “Expected downwards volatility of a firm’s earnings” (Kölbel, Busch, & Jancso, 2017, p. 2268)
Risk as unwanted outcomes	<ul style="list-style-type: none"> • Potential for realization of unwanted, adverse consequences to human life, health, property, or the environment (Maguire & Hardy, 2013) • Potential for loss of wealth (Larrazza-Kintana, Wiseman, Gomez-Mejia, & Welbourne, 2007) • The possibility of suffering harm or loss in pursuit of a desired outcome (Knight, Durham, & Locke, 2001) • Potential for a negative consequence associated with a decision choice (Gómez-Mejía, Haynes, Núñez-Nickel, Jacobson, & Moyano-Fuentes, 2007) • Potential loss of profits and/or assets as a result of changes in political, legal, economic, and social factors in foreign markets where firms compete (Shrader, Oviatt, & Phillips McDougall, 2000)

Risk as outcome uncertainty

The first risk perspective defines risk as uncertainty. Desai (2008), for instance, defines risk as “*activities with uncertain outcomes*”, while Hoskisson et al. (2016) defines risk as “*strategic choices associated with uncertain outcomes*”. In other words, risk is considered decision-making under uncertainty, where the outcomes are unknown. Risk is therefore about uncertainty of an unintended outcome and less to do with the actual unintended outcome itself and the cause of the unintended outcome.

According to this risk perspective, risk is intrinsically related to uncertainty. While uncertainty has long been a central concept in management research, however, multiple definitions and conceptualization has also clouded the meaning of uncertainty (Milliken, 1987; Sutcliffe & Zaheer, 1998). Traditionally, decision theories consider uncertainty to be a characteristic of situations, where the decision-makers can identify multiple potential future outcomes, but are unable to identify probability distributions related to these potential future outcomes (Ellis, Almor, & Shenkar, 2002). Under conditions of uncertainty, decision-makers are therefore unable to accurately predict what the outcomes of a decision might be. According to Bell (1988, p. 20), decision-makers “*confronts an array of states-of-the-world, one of which will ultimately prevail and, given his usually vague information about which of these states will prevail, he must choose an action.*” Thus, uncertainty has to do with decision-makers inability to predict and foresee the potential consequences of their strategic decisions (Beckman, Haunschild, & Phillips, 2004; McKelvie, Haynie, & Gustavsson, 2011) Thus, risk emerges when decision-makers attempt to bring the future into the present to make their decisions. Risk management can therefore be considered the management of uncertainty (MacCrimmon & Wehrung, 1986).

This inability to foresee the consequences of strategic decisions can be ascribed to either a lack of information about potential outcomes of a decision or an inability to assign probabilities as to the likelihood of different outcomes being realized (Milliken, 1987). Risk is therefore related to a lack of knowledge and can be considered “*the difference between the amount of information required to perform the task and the amount of information which has already been obtained*” (Elenkov, 1997). In contrast, under situations of certainty, managers select among a known set of alternative choices with *certain* outcomes. Thus, under certainty risk does not exist. This is also noted by Yates and Stone (1992, p. 11), who argues that “*every conception of risk requires that there must be uncertainty about the outcomes of prospective actions; if the outcomes are guaranteed there is no risk*”. Thus, risk is attributed to imperfect knowledge.

- Uncertainty is often considered an important barrier for effective decision-making (Lipshitz & Strauss, 1997)
- Risk refers to “the unpredictability in decision outcomes” (Das & Teng, 2001, p. 517)

Risk as probabilities of (unwanted) outcomes

Another risk perspective defines risk in statistical terms and distinguishes sharply between risk and uncertainty. For example, Hardy and McGuire (2016, p. 80), defines risk as “*the probability of an adverse event of some magnitude*”. Similarly, Holmes, Bromiley, Devers, Holcomb, and McGuire (2011) defines risk as “situations in which both outcomes and their probabilities of occurrences are known to the decision maker” (Holmes, Bromiley, Devers, Holcomb, & McGuire, 2011). While this risk perspective also defines risk in terms of uncertainty, it only considers the uncertainties which can be quantified with probability arguments, also known as objective uncertainty. Risk is therefore considered a situation where the decision-maker has accurate knowledge of the probability distribution of potential outcomes (Bromiley, Miller, & Rau, 2001). Thus, these definitions align the concepts of probability with risk.

According to this perspective, risk should only be considered a situation in which decision-makers know the possible consequences of their decisions as well as their associated probabilities. Thus, from this perspective a distinction between three decision-making situations: (1) *certainty*, where each action is known to lead invariably to a particular outcome, (2) *risk*, where each action leads to a few known outcomes, each of which occurs with a specific probability, and (3) *uncertainty*, where each action may lead to a set of consequences, but the probabilities of these outcomes are unknown. This distinction can be traced back to Knight’s (1921) seminal definition of risk as situations in which the decision-maker knows what the possible outcomes are and either has exact or estimated knowledge of the probability distribution outcomes.

However, probability-based perspectives on risk has recently been the subject of heavy criticism (e.g. Hardy & Maguire, 2016). For example, it has been argued that risk should not be constrained to a single measure of uncertainty, but rather allow for diverse ways of describing the uncertainties. Thus, probability-based perspective on risk needs to be replaced by a broader risk perspective, which is not linked to one specific measure of uncertainty (Aven, 2013). The problem with probability-based perspectives on risk is, for example, that it cannot account for all uncertainties. Thus, important uncertainties may be hidden within probabilities, including so-called black swan events, that is, events that is unthinkable or extremely unlikely (Paté-Cornell, 2012). Thus, while probability is a useful tool for managing uncertainty, risk should not be constrained to a narrow

Risk as variance/variability

Others define risk in terms of variability (or variance). For example, risk has been defined as variability in performance outcomes (S. Chatterjee et al., 1992; J. S. Miller, Wiseman, & Gomez-Mejia, 2002) (S. Chatterjee et al., 1992), firms cash flow (Alessandri & Seth, 2014), profits (Amit & Livnat, 1988), stock prices (Bansal & Clelland, 2004; D'Aveni & Ilinitch, 1992). This perspective also draws upon probability theory and draws upon statistical sciences in defining risk (Andersen et al., 2014). In probability theory, variance is a measure of dispersion and roughly refers to *"the degree of scatter or variability among a collection of observations"* (Lavrakas, 2008).

The term variance is used both to refer to the dispersion of possible outcomes from a given action as well as the volatility of company performance. Decisions are therefore considered to be riskier to the extent that there is a high degree of variability in potential outcomes (A. L. Pablo, 1997; Sitkin & Pablo, 1992). Researchers adopting this perspective commonly measure risk by measuring the standard deviation or variance in accounting returns or stock prices (Bloom & Milkovich, 1998; Bromiley et al., 2017; Ruefli et al., 1999). This perspective has, however, been criticized for its lack of validity, as it fails to capture how managers see and understand risk. Managers have been found not to see risk as an alternative with variance of the probability of the distribution of possible outcomes that might follow the choice of the alternative (March & Shapira, 1987). For example, managers do not see uncertainty about potentially positive outcomes as risk. In contrast, risk is only seen as being associated with negative outcomes.

Variance has been identified as the second most popular risk measure in the strategic management literature (Ruefli et al., 1999). This includes using standard deviation of ROE and ROA as proxies for variability in performance outcomes (K. D. Miller & Bromiley, 1990). Criticism has however also been directed toward returns variability measures of risk. For example, defining risk as variance has been criticized for treating risk as an ex post phenomenon instead of ex ante uncertainty (Bromiley et al., 2001; Cool, Dierickx, & Jemison, 1989; Noy & Ellis, 2003).

- Defining risk as variance may imply that risk involves both favorable and unfavorable variability in outcomes. This, it accommodates both undesirable and desirable outcomes.

Risk as an unwanted outcome (that may or may not occur)

The final group of definitions considers risk to be an unwanted outcome. For example, Gomez-Mejia et al. (2007) defines risk as potentially negative consequences associated with a decision choice. Similarly, Knight, Durham and Locke (2001) risk as the potential loss or harm in pursuit of a desired outcome.

Comparison of different risk perspectives

In this section, we will compare the four different risk perspectives identified in the management literature. Furthermore, we will look at the time dimension to see if there has been a change in the understanding of risk over time.

Our analysis reveals each risk perspective have a different view on risk, including the key attributes of risk (i.e. the critical characteristics that helps differentiate risk from other concepts), its antecedents (i.e., events or attributes that must arise before risk is present) and the potential consequences of risk (i.e., events or incidents that can occur because of risk).

Table 4: Comparison of four risk perspectives

	Risk as outcome uncertainty	Risk as probabilities	Risk as variance	Risk as unwanted outcomes
Defining attributes: <i>Critical characteristics that help differentiate risk from other concepts</i>	<ul style="list-style-type: none"> Contingency Outcome uncertainty must be inherent in decision-making. If there is outcome certainty there is no risk 	<ul style="list-style-type: none"> Quantification Only measurable uncertainty comprises risk Distribution in outcomes is known 	<ul style="list-style-type: none"> Wide range of potential outcome values Variability in anticipated outcomes 	<ul style="list-style-type: none"> Existence of unwanted outcome Potential realization of unwanted outcome There is potential for significant loss

<p>Antecedents: <i>Events or attributes that must arise before risk is present</i></p>	<ul style="list-style-type: none"> • Lack of knowledge • Complexity? • Imperfection of man's knowledge • Unpredictability in decision outcomes 	<ul style="list-style-type: none"> • Possibility of unwanted outcomes 	<ul style="list-style-type: none"> • Multiple 'future presents' 	<ul style="list-style-type: none"> • Opportunistic behavior • Unforeseen events
<p>Consequences: <i>Events or incidents that can occur because of risk</i></p>	<ul style="list-style-type: none"> • Unwanted outcomes 	<ul style="list-style-type: none"> • Unwanted outcome 	<ul style="list-style-type: none"> • Volatile returns • Outcome uncertainty 	<ul style="list-style-type: none"> • Financial loss? • Corporate ruin