BASE – Revista de Administração e Contabilidade da Unisinos
19(4): outubro/dezembro 2022
Unisinos - doi: 10.4013/base.2022.194.03
ISSN: 1984-8196

The temporal perspective of risk in management: A theoretical framework

Uma Análise Temporal da Gestão de Risco: Proposta de um Modelo Teórico

Elizandra Severgnini[1]
Universidade Tecnológica Federal do Paraná – UTFPR
esevergnini@gmail.com

Valter Vieira[2]
Universidade Estadual de Maringá – UEM
vavieira@uem.br

Gustavo Abib[3]
Universidade Federal do Paraná – UFPR
gustavo.abib@gmail.com

Queila Regina Souza Matitz[3]
Universidade Federal do Paraná – UFPR
queila.matitz@gmail.com

Abstract: The temporal perspective of risk in management lacks analysis when considering its evolution and implications for business and firm performance. Earlier literature discusses risk management aspects limited to a cross-sectional temporal perspective. We collect papers and data from databases such as EBSCO, Scopus, and Web-of-Science and conduct a systematic-temporal analysis. We combine empirical and conceptual papers to elaborate the conceptual framework in our theoretical review. The authors contribute to the literature by (i) defining and classifying risk in management, (ii) analyzing the concept of managing risk from a temporal perspective, (iii) explaining

[1] Universidade Tecnológica Federal do Paraná — Rebouças – CEP 80230-901 – Curitiba (PR) – Brasil
[2] Universidade Estadual de Maringá — Zona 7 – CEP 87020-900 – Maringá (PR) – Brasil
[3] Universidade Federal do Paraná – Centro – CEP 80060-000 – Curitiba (PR) - Brasil

the risk actors, such as society (macro level), market (second macro level) and firm (economic, technical, price, product, etc.), (v) presenting the main scales used for measuring risk and uncertainty, and (vi) discussing risk based on *per se* and based on perception. We conclude the article with four contributions: first, the risk analysis over time happens across three levels, macro, micro, and individual; second, the risk in recent times has been analyzed through the perception of reality, that is, from an individual perspective; third, the authors propose a theoretical model suggesting a cyclical relationship among the risk dimensions; and finally, the distinction that recognizes the difference from a causal analysis to a temporal analysis.
Keywords – Risk; Management; Temporal Perspective.

Resumo: A perspectiva temporal do risco na gestão empresarial carece de análise ao considerar sua evolução e implicação para o desempenho das organizações. A literatura prévia discutiu aspectos da gestão de risco de forma limitada a uma perspectiva temporal transversal. Os autores levantaram artigos e dados disponíveis em bancos de dados, como *EBSCO, Scopus, Web-of-Science* e realizaram uma análise sistemático-temporal. Artigos empíricos e conceituais foram analisados para propor um modelo teórico explicativo. Os autores contribuem para a literatura (i) definindo e classificando o risco na gestão, (ii) analisando o conceito de gestão de risco a partir de uma perspectiva temporal, (iii) apresentando os atores do risco, como sociedade (nível macro), mercado (segundo nível macro) e empresa (econômica, técnica, preço, produto, etc.), (v) apresentando as principais escalas utilizadas para mensurar risco e incerteza e (vi) discutindo o risco com base em si e com base na percepção. Nós concluímos o artigo com quatro contribuições: primeiro, a análise do construto risco ao longo do tempo, demonstrado através de níveis, macro, micro e individual; segundo, risco nos últimos tempos vem sendo analisado pela percepção de realidade, ou seja, em uma perspectiva individual; terceiro, a apresentação de um modelo teórico sugerindo uma relação cíclica entre as dimensões de risco analisada; e por fim, a distinção que se deve fazer de uma análise causal para uma análise temporal.
Palavras-chave – Risco; Gestão; Perspectiva Temporal.

Introduction

Organizations need to manage their risk to create, adjust and organize their strategy across time. Risk is a phenomenon that companies measure when considering investments, analyzing decisions about new products, and assessing conditions for internationalizing their subsidiaries. Previous investigations studied risk using different strategic contexts, such as: mergers and acquisitions (Vertakova, Vselenskaya & Plotnikov, 2021), the risk that includes the lack of sufficient stockpiles and the lack of coordinated efforts to deploy existing resources to the locations of greatest need (Chen, Chong, Feng & Zhang, 2021),

cyber risk (Hillairet & Lopez, 2021), and interconnections among corporate governance, enterprise risk management, and the phenomena of inter-firm risk transfer that occurs in combination with firms' income smoothing (Renzi & Vagnani, 2020).

The temporal perspective of risk, when compared to cross-sectional perspective, can contribute to research because firms understand their past actions, create the present strategy and predict future decisions. In addition, the temporal perspective of risk might emphasize new viewpoints that managers and firms should analyze to make strategic decisions and minimize uncertainty.

Earlier literature has been providing new insights into using the temporal perspective of risk. However, this literature applies a temporal analysis with other constructs. For example, Shi, Sun, and Prescott (2012) systematically assessed the temporal perspective for the merger, acquisition, and alliance literature and identified core temporal mechanisms, relationships, and promising research directions. The authors reviewed 144 published articles, cataloged state of art, and identified critical hurdles to develop future research directions. Berends and Antaconopoulou (2014) examined organizational learning using three sets of mechanisms and considered a temporal analysis -- time as duration; the timing of organizational learning; and the role of the past, present, and future in organizational learning.

Kunisch, Bartunek, Mueller and Huy (2017) critically reviewed strategic change through a temporal analysis, identifying (1) the concept of time in strategic change, (2) time and strategic change activities, and (3) time and strategic change agents. Kunisch et al., (2017) review revealed a need to advance in the processual dynamics of strategic change and presented six paths for advancing future research on strategic change: (1) temporality, (2) actors, (3) emotionality, (4) tools and practices, (5) complexity, and (6) tensions.

A temporal perspective of risk can provide new insights for understanding risk in management. Organizational actors face critical decisions constantly "what might emerge in the future, what was currently at stake, and even what had happened in the past" (Kaplan & Orlikowski 2013, p. 965). Such decisions have risks involved. However, earlier literature on risk is limited to a cross-section analysis (Peljhan & Marc, 2021; Stocker & Abib, 2019). Systematic literature reviews involving the risk construct for the most part focused on specific analyzes of a particular type of risk. For example, Oliveira, Méxas, Meiriño and Drumond (2018) carried out a systematic literature review to identify the main critical success

factors that influence the implementation of an Enterprise Risk Management (ERM). First, Van der Vegt (2018) applied a systematic review to assess public involvement in political circles and the relationship to decision-making risk or governance risk. Second, Lilleholt (2019) conducted a systematic review and meta-analysis to evaluate the relationship between cognitive ability and risk aversion. Finally, Lima, Crema and Verbano (2020) reviewed 61 articles to identify risk management approaches in micro and small companies. Therefore, despite a body of research on risk, no specific study carried out a systematic review of risk and temporality aspects.

Previous studies used the time variable as an aspect of analysis in specific risk contexts. For example, in the experimental field, authors analyzed the time pressure concerning the decision-making process in higher-risk contexts, such as auctions (Haji, Krawczyk, Sylwestrzak & Zawojska, 2019; Wu, Schulz, Pleskac, & Speekenbrink, 2022). Estrada (2000), in a longitudinal study of the European stock market, identified that when measuring the volatility of stocks in a stationary way, they can overestimate or underestimate the systematic risk. A study in the national context, Santos, Klotzle, Silva & Pinto (2022) analyzed the relationship between poverty. The results show risk preferences and time among university students, identifying that low-income students have a greater preference for the present. At the same time, a slight increase in income leads students to be more patient and make choices that are more rational. Given this summary of studies, the authors concluded that there is room for studies that aim to group and analyze the studies that comprise the risk phenomenon to deepen, demonstrate and clarify how the risk phenomenon is defined, conceptualized, classified, measured, and analyzed over time. Furthermore, our research questions are:

- What are the underlying logic, concept, classification, and evolution of risk management from a time perspective?
- How a conceptual framework can cover the intercorrelated constructs and associations in the risk management?

Within this context, this study aims to systematically analyze the underlying logic, concept, classification, and evolution of risk management from a time perspective. For such purpose, the authors propose a conceptual framework, aggregating all the insights generated by the analysis. First, we use the

existing temporal perspective theory to conceptualize prior risk research. Specifically, we use the temporal methodology from Mosakowski and Earley (2000), which incorporated time from a subjective view and used the temporal perceptions of actors when analyzing strategy. Next, we apply temporal perception when analyzing risk, considering three variables: risk, mapping activities to risk, and actors relating to risk from Ancona, Okhuysen, and Perlow (2001). After, we use a discussion of different times and temporalities, considering the macro and micro levels suggested by Bluedorn and Denhardt (1988).

Second, in our systematic-temporal perspective review, we classify each selected study based on its temporal aspect. Then, we evaluate the paper based on specific criteria, such as a way to identify insights, gaps, areas of commonality, and differences within and across the temporal roles. The systematic-temporal perspective provides data for our theoretical framework based on (a) temporal constructs (Bluedorn & Denhardt, 1988), (b) assumptions of time (Ancona, Okhuysen, & Perlow, 2001), (c) temporal referent point (Mosakowski & Earley, 2000), (d) temporal study design, and (e) temporal influence on organizational outcomes.

Our systematic-temporal perspective review is organized in the following way. In the first part, we find out how the risk construct is defined in the literature and its classifications. Next, we show the roles and criteria of the temporal perspective adopted in this study. In addition, building on an in-depth systematic-temporal perspective, we present a comprehensive review of the extant risk-related knowledge. Our theoretical framework reveals broad categories concerning management risk: (1) conceptions of time in managing risk, (2) macro level of risk in terms of society, and (3) market type risk (such as technological, environmental, political, and cultural). Then, we conclude our paper by proposing new avenues for future research on management risk.

Theoretical Background

Definition of Risk

The concept of risk is embedded in a multidisciplinary context in the literature, generating a wide variety of definitions and a lack of consensus about its meaning (Aven, 2012; Damodaran, 2007). Knight's classical perspective (1921) uses risk and uncertainty as a dual element for firms to analyze and make their

decisions and defines this construct as the accurate knowledge of the probability of a result occurring, while uncertainty exists if the likelihood of occurrence of an effect is unknown. In his definition, the risk appears to be quantified (e.g. probability of failing a new product), and uncertainty has a subjective element that is not measured. For Rakow (2010) Knight's (1921) reveals a broader foundation for psychological ideas, which exceeds the risk-uncertainty distinction, adding significant contributions to decision theory.

In psychology, the risk refers to the propensity and aversion to risk in decision-making (Slovic, 1964). A CEO thinks about aversion based on minimizing the risk or maximizing the gain. Thus, the risk is defined as the propensity to gain from a decision, reducing the hazard in the process (Vlek & Stallen, 1980). In the sociological field, the risk is cultural and an individual choice (Renn, 1992). Based on a sociological perspective, the risk is socially elaborated from a constructivist approach (e.g. govern, firms, subjects, and rules). Therefore, the risk is defined as how society considers uncertainty, including well-being risk (Wu, Powers, Zhu & Hannun, 2016) and environmental risk (Williamson, 2016).

In management, earlier literature argues that matched risk and uncertainty are based on the unpredictability of returns. Consequently, the theoretical definition suggests that risk is a random process involving the uncertainty of revenues, costs, profits, and market share (Baird & Thomas, 1985). Based on the management perspective, researchers developed the concept of risk into a global perspective (Bromiley, Miller & Rau, 2001).

The lack of consensus regarding the definition of risk indicates three reasons (Aven, 2012).

1. First, a lack of consensus occurs because of the multidisciplinary existing in its concept. Different areas of study have needs and methods for managing and accessing risk, generating multiple visions about the construct.
2. Second, a lack of consensus regarding the definition of risk happens because there is no agreement on how risk is measured. Authors use one-dimensional, bidimensional (e.g. risk and uncertainty), and multidimensional approaches for measuring risk with an objective or a subjective approach.
3. Third, there is a lack of distinction between real and perceived risks. For example, CEOs have different perceptions about the real and perceived risk of opening a new factory (e.g. risk estimated by probabilities) or launching a new product (e.g. risk perceived by the CEO).

Risk Classification

Our systematic-temporal analysis uses three classical studies for the classifications to organize the lack of consensus and improve the risk understanding. First, Renn (1992) has focused on developing transdisciplinary taxonomy for comparing and analyzing different concepts of risk. Second, Renn (1992) suggested that technical, economic, psychological, sociological, and cultural perspectives are the elements for assessing risk. The technical perspective seeks to anticipate possible undesirable events over time, reducing or avoiding consequences. Economic perspective means identifying the utility described by the degree of subjectiveness with a possible undesired event. The psychological perspective considers subjective judgment about the nature and magnitude of risk, focusing on personal preferences and individual perceptions of probability in decision-making. The sociological perspective believes that unwanted events are socially defined and/or socially constructed. Finally, the cultural perspective assumes that cultural patterns organize the individuals' mindset and social organizations to adopt specific values and reject others.

Aven, Renn, and Rosa (2011) suggested that events, probability models, and measurement help to define risk. First, risk based on events, consequences, and uncertainties means the likelihood of a specific effect originating from a certain hazard occurring within a period. Second, the risk is a parameter of a probability model created by the repetition of the situation (e.g. stochastic or random uncertainties). Third, risk measurements (risk descriptions) refer to definitions based on subjective probabilities.

Kaplan e Mikes (2016) introduced a taxonomy for classifying risk beyond dimensions related to the organizational context. The taxonomy has three risk categories. First, predictability arises from operational breakdowns or employees' unauthorized, illegal, unethical, incorrect, or inappropriate actions. Second, strategy occurs when organizations voluntarily take strategy's execution risk to generate superior returns. CEOs can identify and influence both the likelihood and the impact of their strategy execution risks, but some residual strategy risks would remain. Third, external risk arises from events that the company cannot influence, and CEOs are often unaware of external hazards and unable to assess the likelihood. In summary, each of these studies sought to classify the risk using multidisciplinary ontology

and the origin of the events. These classifications provide researchers with a way of analyzing the concept more in-depth.

Temporal Perspective of Risk

Risk and uncertainty interlace with time. Research has connected risk and uncertainty with the temporal dimension (Wu, Schulz, Pleskac, & Speekenbrink, 2022; Santos, Klotzle, Silva & Pinto (2022) and demonstrated the time importance in an organization's life (Feus, Plotnikof & Stjerne, 2022; Lana, Gama, Bandeira-de-Mello & Marcon, 2018; Aguinis & Bakker, 2021). Drawing on risk and uncertainty, we reviewed the typologies, classifications, and conceptualizations of the time in research of the last years.

The temporal risk perspective considers five dimensions, such as:

1. The first dimension of time that we consider is temporal roles, which refer to the classification of each article into a temporal condition (Bluedron and Denhardt, 1988). Temporary roles concern events of frequency, speed, duration, and stage that occur and are undertaken.
2. The second dimension deals with an assumption of time (Ancona, Okhuysen & Perlow, 2001). The dimension of assumptions of time concerns how time is conceptualized and measured. There are ways of characterizing or describing time as a dimension in which events occur irreversibly – from the past through the future. Four subcategories of time assumptions are analyzed. First, time can be conceptualized and measured as "clock time", reporting a quantifiable, homogeneous, uniform, regular, precise, determinate, and measurable time. Second, time can be conceptualized and measured in a "cyclical time" mode, presenting the frequency of repetitions with an irregular and indefinite style. Third, the time is based on predictable events (e.g. a new product entering the market that takes a significant market share) or unpredictable events (e.g. financial crisis). Fourth, time is directly measured and conceptualized (e.g., variability, velocity, sequence) or is indirectly measured via proxy (Bard & Barry, 2000; Chen, 2012), to demonstrate other constructs of interest (e.g. experience, confidence). The fifth time is objectively (measurable unit, linear and mechanical) or subjectively conceptualized and measured (understood by context interpretation and decision-makers, see Blais & Weber, 2006)

3. The third dimension of time refers to the temporal reference point, in which the risk is located in the past, present, and future (Aven, 2012; Mosakowski & Earley, 2000), and there may be combinations of reference points in the studies.
4. The fourth dimension relates to the construction of time-related risk studies (Baird, & Thomas, 1985). This temporal study design dimension considers how constructs are empirically operationalized over time (e.g. longitudinal, cross-sectional).
5. Finally, the risk temporal perspective influences the organizational outcomes (Dohmen, *et al.* 2011). This rationality examines firms' consequences (e.g. accounting, financial results, subjective evaluations, learning, organizational structures, etc.).

Methodology

Study

Systematic review method is based on the temporal perspective of the research. The focus of this method is to analyze the construct temporal viewpoint based on (a) period (Bluedorn & Denhardt, 1988), (b) assumptions of time (Ancona, Okhuysen, & Perlowi, 2001), (c) temporal referent point (Mosakowski & Earley, 2000), (d) temporal study design, (e) typologies of risk (Aven, Renn & Rosa, 2011), and (f) temporal influence on organizational outcomes. Thus, we use these criteria and references as conditions for analyzing our data. Earlier research used systematic review method based on the temporal perspective on merger and acquisition (Shi, Sun & Prescott, 2012) and strategy change (Kunisch, *et al*., 2017).

Data

Our primary data are risk papers published. We conduct a systematic analysis based on temporal perspective in a sample of papers available in multiple databases, such as EBSCO, Scopus and Web-of-Science. We combined both empirical and conceptual papers in our review to propose our framework. To create our dataset, we searched in the main management journals and databases for generating the sample. We analyze papers from 1971 to 2022. We searched the following main terms "risk" or "risk strategy" and "tim*" or "temp*" in the titles. "Tim and temp" represent time and temporal, respectively. In addition, we apply the filter of research areas, limiting it to "management" and "social science". In order to identify

relevant works on risk and strategic risk, we performed a multi-step analysis, as suggested by (Kunisch *et al*., 2017), where we performed a screening by keywords and abstracts. We found 220 papers with "risk" term and 11 papers with the "risk strategy" terms in the title. Appendices A and B show the papers. Thus, our final sample corresponds to 231 manuscripts.

Paper Exclusion

We excluded some papers that do not deal with risk. For example, we did not use the paper of Li and Li (2013) because they worked on optimal time-consistent strategies under the mean-variance criterion with state-dependent risk aversion. We did not analyze Garcia-Feijóo, Kochard, Sullivan and Wang (2015) because they used a beta-neutral low-risk strategy.

Data Analysis

The authors structured the analysis of the studies in three stages, as follows: First, the classification of the selected studies was structured based on 11 temporal analysis categories and 6 analysis categories for the risk construct, as shown in Table 1.

Table 1.
Analysis Categories

Temporal Analysis Categories		
Category	**Definition**	**References**
When	When should firms adhere to riskier decisions? When is risk taking an important strategic decision? When is the ideal time to take risks?	Bluedorn & Denhardt (1988)
How frequent	How often does a company take risks? The more you take risks, the better the performance?	Bluedorn & Denhardt (1988)
How fast or what speed	How fast is the company taking risks?	Bluedorn & Denhardt (1988)
Experience	Increased experience in risk-taking and its effects on performance.	Bluedorn & Denhardt (1988)
Learning	How does the learning process about risk and uncertainty take place over time? What are the learning backgrounds?	Bluedorn & Denhardt (1988)

What order or sequence	The sequence as an ordered set of initiatives carried out over time	Bluedorn & Denhardt (1988)
Event time predictable?	Is there a level of certainty about the probability of an event?	Ancona, Okhuysen, & Perlow (2001)
Event time unpredictable?	Is there no level of certainty about the probability of an event?	Ancona, Okhuysen, & Perlow (2001)
Is time objective or subjective?	Objective (measurable unit) subjective (interpretation)	Ancona, Okhuysen, & Perlow (2001)
Is time studied directly or as a proxy?	Proxy (experience, trust), directly (variability, speed, sequence)	Ancona, Okhuysen, & Perlow (2001)
Past, present and future	Temporal referent point	Mosakowski & Earley (2000)

Categories for the Risk Construct

Risk concept	How risk is conceptualized?	Aven and Renn (2009); Knight's (1921)
Type of risk	Events; modeling or measurement?	Renn (1992); Aven, Renn, and Rosa (2011); Kaplan e Miles (2015)
Antecedent	What precedes risk?	Aven, Renn, and Rosa (2011); Kaplan e Mikes (2016)
Consequences	What are the consequences generated by the presence of risk?	Aven, Renn, and Rosa (2011); Kaplan e Mikes (2016)
Mediators; Moderators	Which variables influence or interfere in the relationship between risk and other constructs?	Aven, Renn, and Rosa (2011); Kaplan e Mikes (2016)

After this first step, we continued classifying each study according to its temporal role according to six criteria; insights, gaps, areas of similarity and difference, within and between temporal roles and risk constructs, as applied by Shi, Sun, and Prescott (2012). In this step, we mainly highlight the time-related considerations in the studies.

At least one of the authors performed the two stages, and the categorization was structured based on previously published studies and on the reading of the 233 selected articles. When there were doubts about any classification between the categories and criteria defined, then they applied an iterative step to

align the multiple points of analysis and comparison of the studies, as recommended in the studies of Kunisch et al. (2017) e Shi, Sun, and Prescott (2012).

Results

Definition of Risk

According to Aven and Renn (2009, p.2), "risk refers to uncertainty about and severity of the consequences (or outcomes) of an activity with respect to something that humans [or their institutions] value." When the consequence has a high level of severity, then the risk is perceived as high. In management, this means that when the result of launching a new product might produce damage (e.g. hydroelectric dam), a company decision has a high risk. Beck (1992, p.21) defines risk "as a systematic way of dealing with hazards and insecurities introduced by modernization itself". In management, this rationality indicates that a company's decision needs to consider hazards and insecurities involving customers, production, distribution, stock exchange, environmental concerns, etc. For Aven (2012, p.36), risk is defined as "either the possibility/uncertainty/chance that the activity will have some undesirable consequences, or the activity (person, gasworks) itself, that which is often also referred to as a risk source or a threat".

According to Rohrmann (2005, p.2), risk refers to "the possibility of physical, social or financial harm/detriment/loss due to a hazard, perceived risk magnitude refers to a person's judgment (opinion, belief) about how large the risk is associated with a hazard (regarding negative outcomes) and risk attitude is a generic orientation (as a mind-set) toward avoiding a risk when deciding how to proceed in situations with uncertain outcomes". Rohrmann (2005) defined risk based on three conditions, a hazard, a person's judgment, and a broad approach (as a mindset) toward avoiding a risk.

Classification of Risk

Risk is an expected value. For instance, a specific program is designed to enhance security and overall preparedness to prevent, respond to, and recover from acts of terrorism (Narayan & Srianantha kumar, 2018). Risk is the probability of an undesired event—for example, the risk of a company's bankruptcy (Agustia, Muhammad & Permatasari, 2020). Risk is objective uncertainty. In that

condition, the risk is a concerning cost or an outcome (e.g. Singh & Hong, 2020). Risk as a loss potential. Risk is the probability of different scenarios. For example, the risk of losing a supplier (Kim, Wagner & Colicchia, 2019).

Dimensions of Risk

Cox (1967, p.37) suggests that risk contains two aspects: "the amount that would be lost if the consequences of an act were not favorable, and the individual's subjective feeling of certainty that the consequences will be unfavorable". These aspects consider the objective loss and the individuals' subjective loss about unfavorable results.

Risk can consider three dimensions (Graetz & Franks, 2016, p.2-3): (1) property, which "refers to perception that a certain activity, development or technology may result in negative (or positive) outcomes" for a corporation; (2) power ("the capacity of an actor or actors to influence the course of certain events or actions and/or the behavior of other actors"), and (3) politics, which is "the struggles which result from the collisions between human purposes, and the expedients and practices which human beings have invented to cooperate and compete with one another in pursuing their purposes" (Dunn, 2000, p.133). For example, in management, a pharmaceutical company can develop a technology that may result in negative outcomes. In human resource management, there is the organizational risk of individuals competing with one another (Dunn, 2000).

In consumer behavior literature, the risk is analyzed from the consumer behavior perception, and according to Fuchs and Reichel (2011, p.267), its dimensions are

> "physical – the risk of physical harm to the consumer as a result of product malfunction; financial – the risk that the investment in the product will be lost; performance – the risk identified with the possibility that the product will not operate as expected, or will fail; social – the fear that the purchase will not conform to the standards of the reference group; psychological – the fear that the product will not suit the consumer's self-image; time – the possibility that product consumption will be excessively time consuming; and opportunity loss – the risk that by taking a course of action, the consumer will miss out on alternative preferred activities".

Risk Outside Organization (Society)

Risk can be analyzed from a social viewpoint. The risk management society is "concerned with identifying and distributing risks arising from industrial activities while downplaying natural and other risks" (Bergkamp, 2017, p.1). In the risk management society, the population, government, and stakeholders should be interested in what industrial activities may increase risk and how to manage it.

Kytle and Ruggie (2005, p.1) suggest that "from a company perspective, social risk, like any other risk, arises when its own behavior or the action of others in its operating environment creates vulnerabilities. In the case of social risk, stakeholders may identify those vulnerabilities and apply pressure on the corporation for behavioral changes".

According to Graetz and Franks (2015), social risk "is the perceived or expected potential future threats to, and unwanted impacts on, individuals and groups of individuals arising from the processes of social change precipitated by development interventions and the decisions of external actors, namely, businesses, industry organizations, financiers, executive governments, regulators and NGOs". Another example of social risk is "the net loss of a life insurance company issuing equity-linked pure endowments in the case of periodic premiums" (Chen, 2012, p. 2008).

Foreseeable aspect of Risk

- Risk can be predictable. When the risk is predictable, companies should estimate reliably. In estimating the risk or predicting its value, companies use mathematical formulas, forecast models, Markov models, econometric models, and others. Estimating the risk is to create objective values of the degree of uncertainty in launching a product, opening a new plant, internationalizing an organization, etc.
- Risk can be unpredictable. When the risk is unpredictable, managers are challenged to make strategic decisions that tend not to undermine performance. The risk being unpredictable, there is greater uncertainty about actions and decisions, which can generate negative consequences (e.g. less profits, sales, revenues) and sometimes consequences with a high cost for the company. Models that create scenarios to reduce risk unpredictability can help mitigate the potential problems of strategic actions and management decisions.

Risk Measurement/scales

One Dimension Scale. Dohmen et al. (2011) suggested one question to risk-taking propensity: "How do you see yourself? Are you generally a person who is fully prepared to take risks or do you try to avoid taking risks? Please tick a box on the scale, where the value 0 means 'not at all willing to take risks' and the value 10 means 'very willing to take risks'. Bettman (1973) used only one dimension to measure risk. He replaced relevance for outcomes to conceptualize risk. His question is "How risky is the purchase of _____?".

Multi-dimension scales. Blais and Weber (2006) suggested a scale domain-specific risk-taking (DOSPERT) scale for adult populations. Domain-Specific Risk-Taking Scale is a psychometric scale that assesses risk-taking in five content domains: financial decisions (separately for investing versus gambling), health/safety, recreational, ethical, and social decisions (Weber, Blais & Betz 2002).

Chen (2012) developed a scale measuring the perceived risk associated with online shopping (PRIS). Four components: financial risk, product performance risk, time/convenience risk, and privacy/security risk.

Zheng (2013) developed the risky financial behavior scale (RFBS), which has the following dimensions financial related behaviors, financial related personality, financial attitude toward risks, and returns financial confidence level. Van Osch and Stiggelbout (2007) developed the health-risk attitude scale (HRAS) to assess how persons value their health and manage health risks. The HRAS aims to predict how a person will resolve risky health decisions in the future.

Grable and Lytton (1999) developed a 13-item financial risk-tolerance assessment instrument. Financial risk tolerance is a significant factor in several household financial decisions. Gilliam, Chatterjee and Grable (2010) compared two empirical measures of risk tolerance and separately examined the association between these measures of risk tolerance and asset allocation. The instruments used to determine investors' perception of financial risk tolerance are the Survey of Consumer Finance's (SCF) single-question measure and a 13-item, multidimensional measure developed by Grable and Lytton (1999). In addition, a sample of 328 respondents, predominantly faculty and staff at colleges and

universities in the Southwest, completed a 38-question, web-based survey. Results suggest that, while both scales are associated with a preference for risky or non-risky asset allocation among respondents, the 13-item scale has greater explanatory power.

Szrek, Chao, Ramlagan and Peltzer (2012) compared four different risk-taking propensity measures on their ability to describe and predict risky behavior in the health domain. Szrek et al (2012) suggested that the one-item general measure is the best predictor of risky health behavior in our population, predicting two out of four behaviors at the 5% level and the remaining two at the 10% level. The risk-taking propensity measure "is the most common measure of an individual's risk-taking propensity in the economics literature. For example, the participant in HL makes ten different choices between gambles, where each choice entails choosing between a "risky" gamble and a "safer" gamble" (Szrek et al. 2012, p.717). For a review of this scale, see Holt and Laury (2002).

Lejuez et al., (2002) proposed the BART (Balloon Analog Risk Task) scale, a risk-taking propensity measure performed on a computer for assessing behavioral risk tasks. The BART has 30 tasks. Bard and Barry (2000) developed a scale measuring an economic agent's attitude toward risk. Using a Likert procedure, the scale assesses risk attitudes by eliciting farmers' opinions towards risk management tools. Deck, Lee, Reyes and Rosen, (2010) paper reported the results of a study measuring risk behavior using multiple paid elicitation tasks. Consistent with previous puzzling results in the literature, the authors found considerable within-subject variation in behavior across tasks.

Theoretical Framework

CEOs and managers need to think constantly about their strategic decisions. Different perspectives of risk influence the way that CEOs make their strategic decisions. Ahead, we discuss some perspectives. First, managers need to analyze the firm's accounts, balance sheet, financial statements, market value, and financial health when considering economic risk. These economic and financial elements lead to a rational decision on investments. Second, when considering technical risk, CEOs need to analyze the production line, innovation, product development, and P&D. Technical risk refers to the contact with loss resulting from actions such as design and engineering, manufacturing, technological processes, and test procedures. Third, firms pay attention to how to manage the product and price risks. The former refers to how the

market and consumers would receive the new product or incremental innovation. The latter refers to the perception of the price. A new product with a lower price can suggest low quality. Otherwise, a new product with a high price cannot sell as much quantity as expected.

Risk seeking and risk aversion are two orthogonal dimensions. Risk seeking suggests that managers are looking to take the risks and are not opposed to uncertainty. According to Åstebro (2003, p.237), risk-seeking is "one of several plausible reasons why many inventors proceed to develop their inventions, while only a small fraction can reasonably expect to earn positive returns on their efforts". Thus, risk seeking refers to managing risk under different conditions. Kodak and Xerox were companies in the copier business market with risk aversion to the digital market.

Risk aversion is the opposite and suggests that CEOs analyze the uncertainty and the risk of making their strategic decisions to behave (Forecatu & Onculer, 2016). Risk aversion refers to how managers and CEOs would avoid uncertainty and wrong strategic decisions. Risk aversion suggests a CEO is cautious about his/her decisions, afraid of dangerous strategic choices, and watches over the organization's well-being. The two orthogonal dimensions of risk can moderate the relationship between strategic decision-making and organizational performance.

On the outside level of the firm, we have two main macro aspects of risk, such as (i) society and (ii) market. Society is the risk associated with human rights' transgressions. At the firm level, the organization would not harm employees or even interfere with their human rights. In addition, at the firm level, livelihood risk means that the organization will pay salaries, benefits, and labor-rights correctly while not abusing unethical practices.

At the market level, technological risk derives "from social processes and cannot be reduced to physical, chemical, and biological dimensions alone" (Freitas & Gomes, 2006, p.485). Technological risk refers to investment in technological production and process, innovation and political market change. For example, the technological risk in the movie industry when changing from VHS to DVD and from DVD to streaming (Amazon, Netflix). In addition, the technological risks can be "cyber-attacks, massive incidents of data fraud or theft, and massive digital misinformation caught my eye in particular" (Shah, 2013). Forbes Insights and KPMG explored the technology risk, surveying more than 200 firms, and showed that "87% do not consistently use data analytics to develop Key Risk Indicators" (Moreno, 2018).

Environmental risk means that CEOs must manage their production to generate a sustainable environment. Environmental risk means firms follow correct rules to avoid personal, social, environmental, and market damage. According to Fairlex Financial Dictionary (2012), environmental risk is a hazard "that a certain business venture or activity will destroy the surrounding natural environment. For example, if oil reserves were discovered in a national park, there would be the environmental risk that exploiting the reserves might harm or destroy some of the park's wildlife".

Political risk is accomplished outside the company, and firms must comprehend how the country or state is managed according to political decisions. Political choices may influence the environmental, economic, and technological risks, which, from the macro to the micro level, political choices impact a firm's risk, reducing performance. For example, how natural resource wealth affects the incentives of governments to uphold contracts with foreign investors across all sectors (Jensen & Johnston, 2011). According to Costa and Figueira (2017, p.64), "political risk is an important dimension of the institutional environment because multinational companies mainly face a new political system and set of rules in a new location". In political risk, geopolitical impact includes, for instance, the opening of Brexit negotiations.

Cultural risk suggests that CEOs organize their strategies based on cultures and subcultures because "the relative weights of the individual risk characteristics depend on social and cultural factors that form the main research agenda for cross-cultural research" (Renn & Rohrmann, 2000, p.211). When Disney Company Co opens a new park in Paris, France, the firm needs to comprehend local customs and consumer behavior to offer its products and reduce cultural risk. The Covid-19 pandemic has fueled a risk-taking culture (Chen, Chong, Feng & Zhang, 2021; Guenther, Galizzi & Sanders, 2021). In our theoretical model, we suggest that the three levels. Then, society (e.g. society, human rights, and livelihood risk) influences the macro level from market (e.g. technological, environmental, political, cultural and economic), which affects strategic decisions and performance.

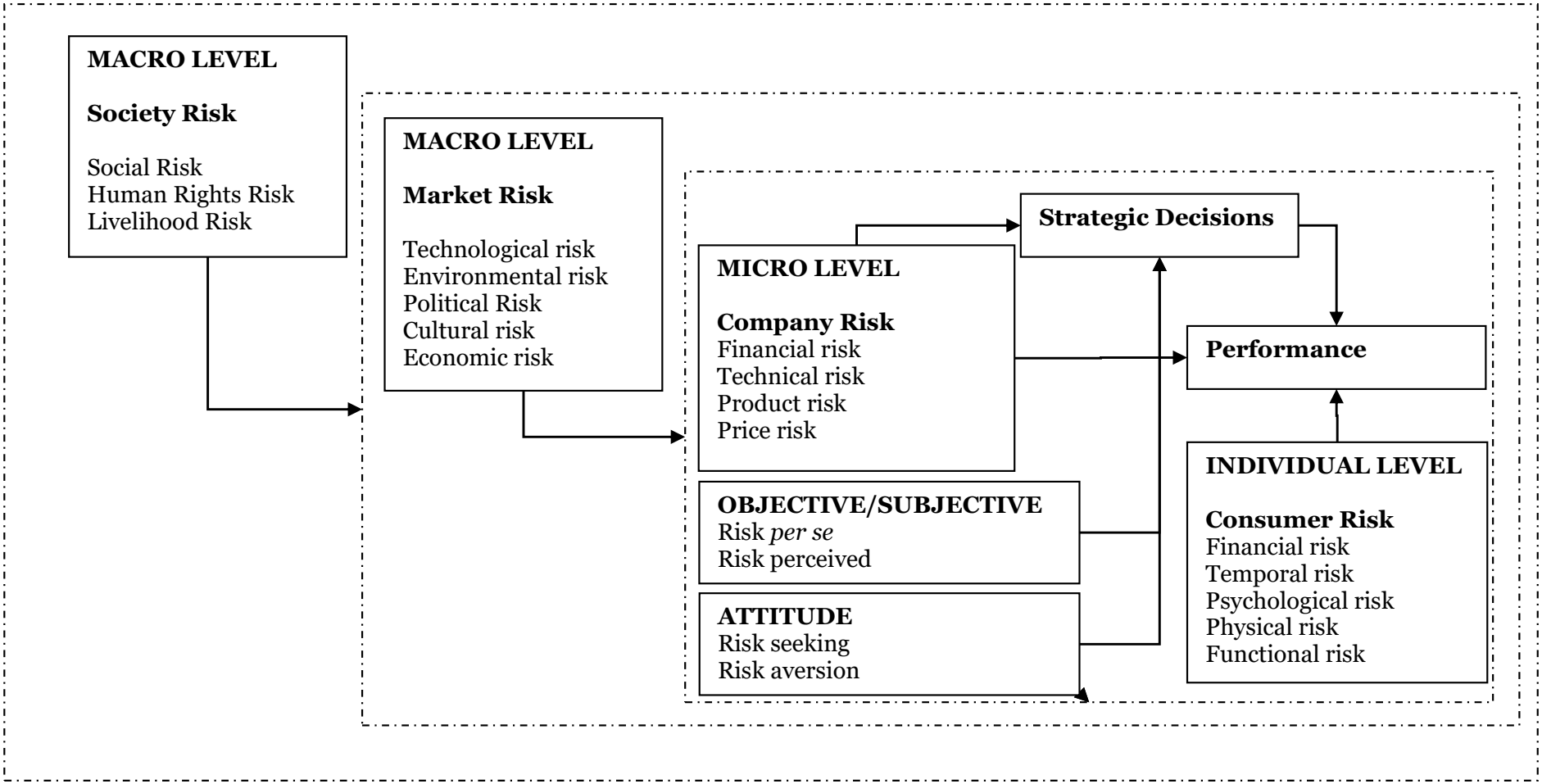

Figure 1. Theoretical Framework of macro and micro aspects of risk

The Theoretical Framework presented here seeks to classify the levels of risk and it's impact on the company's performance through strategic decisions. At the broader level, we have the society risk that influences the market risk (both are macro-level risks). The strategic decision is externally impacted by market risk and internally by the company and individual risks. Finally, strategic decisions are impacted by individual behavior and the kind of risk (objective or subjective). This framework allows researchers to understand the complete picture of the risk in the research field.

This framework is aligned with Knight's (1921) propositions, linking macro and microeconomics risk aspects. For Knight, the best understanding is joining the micro level (company and individual) with macro levels (society and market) to target performance, called by him profit. The analysis is complex and deals with several variables (temporarily distributed).

General Considerations

Notwithstanding research on risk, theoretical frameworks on temporal perspective of management risk are still lacking. Earlier literature has been providing new insights in using temporal systematic perspective in other fields (Shi, Sun & Prescott 2012; Berends & Antaconopoulou, 2014; Kunisch et al., 2017). Based on this methodological tool, we expand the temporal perspective by assessing the underlying logic, concept and evolution of risk. We use existing theory on temporal perspective to conceptualize prior research on management risk analyzing 211 papers on risk and 11 papers on risk management (see Mosakowski & Earley, 2000; Bluedorn & Denhardt, 1988).

This study presents four contributions. The first main contribution is that we also use the assumption of time when analyzing risk, considering three categories of variables, such as risk, mapping activities to risk, and actors relating to risk from Ancona, Okhuysen and Perlow (2001). Risk is analyzed from macro (e.g. from market perspective and its factors) and micro level of analysis (e.g. from a firm viewpoint and its factors). In analyzing the logic behind uncertainty, we note that risk management is designed for reducing hazard problems.

The second main contribution is that risk is based on perception and reality. When risk is based on perception, individuals analyze the uncertainty of a given event based on subjective aspects. This dimension is dangerous, since negative outcomes can happen. When risk is based on per se, firms use

rational and logic models to analyze the uncertainty of a given event based on Markov models, econometric models, time-series models, and so forth. In analyzing actors relating to risk based on Ancona, Okhuysen and Perlow (2001), consumers and managers can make their decisions based on two main aspects. Consumers as actors can analyze risk from the perception of financial risk, temporal risk, psychological risk, physical risk and functional risk. Managers and CEOs as actors can analyze risk from reality, such as risk seeking and risk aversion.

The third main contribution is that our theoretical model suggests cyclical relationships. While macro risk can affect market risk dimensions, these two uncertainties affect the way that firms make their strategic decisions and achieve performance. Of course, the macro aspects of risk influence the way that the company deals with micro dimensions of risk (such as economic, technical, price, product, etc.), which consequently influences performance.

The fourth contribution of this study is the demonstration that effects occur over time, and such effects need to be distinguished from causal effects. Time can confirm or falsify hypotheses, previously constructed and argued under the logic of causal effect. This is because the moment of occurrence, the duration of the phenomenon, the frequency by which it occurs and the expected sequence of a series of events can affect the course of variables, such as the risk associated with other analyzed constructs. Moreover, companies can invest in risk management, which reviews historic strategic decisions and looks to reduce indecision.

Limitations and Future Research

This paper is not free of limitations, given the methodological and theoretical choices of the researchers, which can be solved in future research. First, the paper was limited to the period in which we analyzed the papers. Future research may advance the temporal issue and encompass a larger search scope. Second, the paper is limited to the mixed aspects of risk, such as macro and micro dimensions of risk. Future research may advance the choice of macro aspects of risk and discuss specific aspects that deal only with macro risk, suggesting another theoretical paper. In addition, future investigations may expand the choice of micro aspects of risk (e.g. technological, product, price, economic/financial) and discuss specific aspects of how micro aspects of risk are dependent on the macro dimension. Third, the authors

chose to review the existing scales for measuring risk. Research may implement a meta-analytic review on the effects of risk in terms of antecedents and consequences.

References

Aguinis, H., & Bakker, R. M. (2021). Time is of the essence: Improving the conceptualization and measurement of time. Human Resource Management Review, 31(2), 100763. https://doi.org/10.1016/j.hrmr.2020.100763

Agustia, D., Muhammad, N. P. A., & Permatasari, Y. (2020). Earnings management, business strategy, and bankruptcy risk: evidence from Indonesia. Heliyon, 6(2), e03317. https://doi.org/10.1016/j.heliyon.2020.e03317

Ancona, D. G., Okhuysen, G. A., & Perlow, L. A. (2001). Taking time to integrate temporal research. Academy of Management Review, 26(4), 512-529. https://doi.org/10.2307/3560239

Åstebro, T. (2003). The return to independent invention: evidence of unrealistic optimism, risk seeking or skewness loving?. The Economic Journal, 113(484), 226-239. https://doi.org/10.1111/1468-0297.00089

Aven, T. (2012). The risk concept-historical and recent development trends. Reliability Engineering & System Safety, 99(1), 33-44. https://doi.org/10.1016/j.ress.2011.11.006

Aven, T., & Renn, O. (2009). On risk defined as an event where the outcome is uncertain. Journal of Risk Research, 12(1), 1-11. https://doi.org/10.1080/13669870802488883

Aven, T., Renn, O., & Rosa, E. A. (2011). On the ontological status of the concept of risk. Safety Science, 49(8), 1074-1079. https://doi.org/10.1016/j.ssci.2011.04.015

Baird, I. S., & Thomas, H. (1985). Toward a contingency model of strategic risk taking. Academy of Management Review, 10(2), 230-243. https://doi.org/10.2307/257965

Bard, S. K., & Barry, P. J. (2000). Developing a scale for assessing risk attitudes of agricultural decision makers. The International Food and Agribusiness Management Review, 3(1), 9-25. https://doi.org/10.1016/S1096-7508(00)00024-0

Beck U. (1992). Risk Society. Towards a New Modernity. London: Sage.

Berends, H. & Antonacopoulou, E. (2014), Time and Organizational Learning: A Review and Agenda for Future Research. International Journal of Management Reviews, 16: 437-453. https://doi.org/10.1111/ijmr.12029

Bergkamp, L. (2017). The concept of risk society as a model for risk regulation-its hidden and not so hidden ambitions, side effects, and risks. Journal of Risk Research, 20(10), 1275-1291. https://doi.org/10.1080/13669877.2016.1153500

Bettman, J. R. (1973). Perceived risk and its components: A model and empirical test. Journal of Marketing Research, 10(2), 184-190. https://doi.org/10.1177/002224377301000209

Blais, A. R., & Weber, E. U. (2006). A domain-specific risk-taking (DOSPERT) scale for adult populations. Judgment and Decision Making, 1(1), 33-47. https://doi.org/10.1017/S1930297500000334

Bluedorn, A. C., & Denhardt, R. B. (1988). Time and organizations. Journal of Management, 14(2), 299-320. https://doi.org/10.1177/014920638801400209

Bromiley, P., Miller, K. D., & Rau, D. (2001). Risk in Strategic Management Research. The Blackwell Handbook of Strategic Management, (eds) Michael A. Hitt, R. Edward Freeman andJeffrey S. Harrison pp. 259-288.

Chen, C. (2012). PRIS: A multiple-item scale for measuring perceived risk of Internet shopping. Doctoral Dissertation, Purdue University, West Lafayette, IN.

Chen, X., Chong, W. F., Feng, R., & Zhang, L. (2021). Pandemic risk management: resources contingency planning and allocation. Insurance: Mathematics and Economics, 101(B), 359-383. https://doi.org/10.1016/j.insmatheco.2021.08.001

Costa, L. P. S., & Figueira, A. C. R. (2017). Political risk and internationalization of enterprises: a literature review. Cadernos EBAPE.BR, 15(1), 63-87. https://doi.org/10.1590/1679-395156933

Cox, D. F. (1967). Risk taking and information handling in consumer behavior. Boston, MA: Harvard University Press.

Damodaran, A. (2007). Strategic risk taking: a framework for risk management. Pearson Prentice Hall.

Deck, C., Lee, J., Reyes, J., & Rosen, C. (2010). Measuring risk aversion on multiple tasks: Can domain specific risk attitudes explain apparently inconsistent behavior? Working Paper. Available at https://pdfs.semanticscholar.org/0915/6f78ba1fee8e79ce16e5666740e25cbd0a1a.pdf captured in December 20th, 2017.

Dohmen, T., Falk, A., Huffman, D., Sunde, U., Schupp, J., & Wagner, G. (2011). Individual risk attitudes: Measurement, determinants, and behavioral consequences. Journal of the European Economic Association. 9(3), 522-550. https://doi.org/10.1111/j.1542-4774.2011.01015.x

Dunn, J. (2000). The Cunning of Unreason: Making Sense of Politics. New York: Basic Books.

Estrada, J. (2000). The temporal dimension of risk. The Quarterly Review of Economics and Finance 40(1), 189-204. https://doi.org/10.1016/S1062-9769(99)00056-3

Farlex Financial Dictionary. (2012). Environmental risk.Available at https://financial-dictionary.thefreedictionary.com/Environmental+risk Captured in December 20th, 2017. Farlex, Inc.

Ferecatu, A., & Önçüler, A. (2016). Heterogeneous risk and time preferences. Journal of Risk and Uncertainty, 53(1), 1-28. https://doi.org/10.1007/s11166-016-9243-x

Feuls, M., Plotnikof, M. & Stjerne, I.S. (2022). Timely methods: a methodological agenda for researching the temporal in organizing. Qualitative Research in Organizations and Management, Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/QROM-05-2021-2141

Freitas, Carlos Machado de, & Gomez, Carlos Minayo. (1996). Análise de riscos tecnológicos na perspectiva das ciências sociais. História, Ciências, Saúde-Manguinhos, 3(3), 485-504. https://doi.org/10.1590/S0104-59701996000300006

Fuchs, G., & Reichel, A. (2011). An exploratory inquiry into destination risk perceptions and risk reduction strategies of first time vs. repeat visitors to a highly volatile destination. Tourism Management, 32(2), 266-276. https://doi.org/10.1016/j.tourman.2010.01.012

Garcia-Feijóo, L., Kochard, L., Sullivan, R. N., & Wang, P. (2015). Low-Volatility Cycles: The Influence of Valuation and Momentum on Low-Volatility Portfolios. Financial Analysts Journal, 71(3), 47-60. https://doi.org/10.2469/faj.v71.n3.2

Gilliam, J., Chatterjee, S., & Grable, J. E. (2010). Measuring the perception of financial risk tolerance: A tale of two measures. In: Association for Financial Counseling and Planning Education, pp. 30-44. Available at https://afcpe.org/assets/pdf/vol_21_issue_2_gilliam_chatterjee_grable.pdf captured in December 20th, 2017.

Grable, J., & Lytton, R. H. (1999). Financial risk tolerance revisited: the development of a risk assessment instrument. Financial Services Review, 8(3), 163-181. https://doi.org/10.1016/S1057-0810(99)00041-4

Graetz, G., & Franks, D. M. (2016). Conceptualising social risk and business risk associated with private sector development projects. Journal of Risk Research, 19(5), 581-601. https://doi.org/10.1080/13669877.2014.1003323

Guenther, B., Galizzi, M. M., & Sanders, J. G. (2021). Heterogeneity in risk-taking during the COVID-19 pandemic: evidence from the UK lockdown. Frontiers in Psychology, 12(1), 1-15. https://doi.org/10.3389/fpsyg.2021.643653

Haji, A., Krawczyk, M., Sylwestrzak, M., & Zawojska, E. (2019). Time pressure and risk taking in auctions: A field experiment. Journal of Behavioral and Experimental Economics, 78(1), 68-79. https://doi.org/10.1016/j.socec.2018.12.001

Hillairet, C., & Lopez, O. (2021). Propagation of cyber incidents in an insurance portfolio: counting processes combined with compartmental epidemiological models. Scandinavian Actuarial Journal, 2021(8), 671-694. https://doi.org/10.1080/03461238.2021.1872694

Holt, C., & Laury, S. (2002). Risk aversion and incentive effects. The American Economic Review. 92(5), 1644-1655. https://doi.org/10.1257/000282802762024700

Jensen, N. M., & Johnston, N. P. (2011). Political risk, reputation, and the resource curse. Comparative Political Studies, 44(6), 662-688. https://doi.org/10.1177/0010414011401208

Kaplan, R. S., & Mikes, A. (2016). Risk management-The revealing hand. Journal of Applied Corporate Finance, 28(1), 8-18. https://doi.org/10.1111/jacf.12155

Kaplan, S., & Orlikowski, W. J. (2013). Temporal work in strategy making. Organization Science, 24(4), 965-995. https://doi.org/10.1287/orsc.1120.0792

Kim, S., Wagner, S. M., & Colicchia, C. (2019). The impact of supplier sustainability risk on shareholder value. Journal of Supply Chain Management, 55(1), 71-87. https://doi.org/10.1111/jscm.12188

Knight, F.H. (1921). Risk, Uncertainty, and Profit. Houghton Mifflin Co. Boston.

Kunisch, S., Bartunek, J., Mueller, J., & Huy, Q. (2017). Time in strategic change research. Academy of Management Annals June 2017, 11 (2) 1005-1064. https://doi.org/10.5465/annals.2015.0133

Kytle, B. & Ruggie, J. G. (2005). Corporate Social Responsibility as Risk Management: A Model for Multinationals. Working Paper No. 10, Corporate Social Responsibility Initiative. Cambridge, MA: John F. Kennedy School of Government, Harvard University. Available at https://sites.hks.harvard.edu/m-rcbg/CSRI/publications/workingpaper_10_kytle_ruggie.pdf captured December 20th, 2017.

Lana, J., Gama, M. A. B., Bandeira-de-Mello, R., & Marcon, R. (2018). O tempo como legitimador da causa: Implicações temporais em pesquisas de administração. Revista Alcance, 25(1), 106-119. https://doi.org/10.14210/alcance.v25n1(Jan/Abr).p106-119

Lejuez, C., Read, J., Kahler, C., Richards, J., Ramsey, S., Stuart, G., Strong, D., Brown, R. (2002). Evaluation of a behavioral measure of risk taking: the balloon analogue risk task (BART) Journal of Experimental Psychology: Applied. 8(2), 75-84. https://doi.org/10.1037/1076-898X.8.2.75

Li, Y., & Li, Z., (2013). Optimal time-consistent investment and reinsurance strategies for mean-variance insurers with state dependent risk aversion. Insurance: Mathematics and Economics, 53(1), 86-87. https://doi.org/10.1016/j.insmatheco.2013.03.008

Lilleholt, L. (2019). Cognitive ability and risk aversion: A systematic review and meta analysis. Judgment and Decision Making, 14(3), 234-279. https://doi.org/10.1017/S1930297500004307

Lima, P. F. A., Crema, M., & Verbano, C. (2020). Risk management in SMEs: A systematic literature review and future directions. European Management Journal, 38(1), 78-94. https://doi.org/10.1016/j.emj.2019.06.005

Moreno, H. (2018). How To Manage Tech Risk Proactively. Forbes, Feb 23, 2018, available at https://www.forbes.com/sites/forbesinsights/2018/02/23/how-to-manage-tech-risk-proactively/?sh=7b479df32b22 01:48pm.

Mosakowski, E., & Earley, P. C. (2000). A selective review of time assumptions in strategy research. Academy of Management Review, 25(4), 796-812. https://doi.org/10.2307/259207

Narayan, S., Le, T. H., & Sriananthakumar, S. (2018). The influence of terrorism risk on stock market integration: Evidence from eight OECD countries. International Review of Financial Analysis, 58(1), 247-259. https://doi.org/10.1016/j.irfa.2018.03.011

Oliveira, K., Méxas, M., Meiriño, M., & Drumond, G. (2018). Critical success factors associated with the implementation of enterprise risk management. Journal of Risk Research, 22(6), 1-16. https://doi.org/10.1080/13669877.2018.1437061

Peljhan, D., & Marc, M. (2021). Risk management and strategy alignment: influence on new product development performance. Technology Analysis & Strategic Management, 1-13. https://doi.org/10.1080/09537325.2021.2011192

Rakow T. (2010). Risk, uncertainty, and prophet: The psychological insights of Frank H. Knight. Judgment and Decision Making 5(6). pp. 458-466. https://doi.org/10.1017/S1930297500001303

Renn O. (1992). Concepts of Risk: A Classification. In: Krimsky S, Golding D, (editors). Social Theories of Risk. Westport, CT: Praeger, pp. 53-79.

Renn O., Rohrmann B. (2000) Cross-Cultural Risk Perception: State and Challenges. In: Renn O., Rohrmann B. (editors) Cross-Cultural Risk Perception. Technology, Risk, and Society (An International Series in Risk Analysis), vol 13. Springer, Boston, MA. https://doi.org/10.1007/978-1-4757-4891-8

Renzi, A., & Vagnani, G. (2020). Corporate Governance, Enterprise Risk Management, and Inter-temporal Risk Transfer. Journal of Modern Accounting and Auditing, 16(3), 105-116. https://doi.org/10.17265/1548-6583/2020.03.001

Rohrmann, B. (2005). Risk attitude scales: concepts, questionnaires, utilizations. Project report. Available at http://www.rohrmannresearch.net/pdfs/rohrmann-ras-report.pdf , 13, 2012. Captured in December 20th, 2017.

Santos, É. T. D., Klotzle, M. C., Silva, P. V. J. D. G., & Pinto, A. C. F. (2022). Como jovens universitários de baixa renda lidam com as preferências ao risco e tempo no Brasil?. Revista Contabilidade & Finanças, 33(90), 1-16. https://doi.org/10.1590/1808-057x20221511.pt

Shah, R. (2013). Enviromental Risk. Available at https://www.forbes.com/sites/rawnshah/ Captured in December 20th, 2017.

Shi, W., Sun, J., & Prescott, J. E. (2012). A temporal perspective of merger and acquisition and strategic alliance initiatives: Review and future direction. Journal of Management, 38(1), 164-209. https://doi.org/10.1177/0149206311424942

Singh, N. P., & Hong, P. C. (2020). Impact of strategic and operational risk management practices on firm performance: An empirical investigation. European Management Journal, 38(5), 723-735. https://doi.org/10.1016/j.emj.2020.03.003

Slovic, P. (1964). Assessment of risk taking behavior. Psychological Bulletin, 61(3), 220-233. https://doi.org/10.1037/h0043608

Stocker, F., & Abib, G. (2019). Gerenciamento de Riscos em Born globals: o caso das Cervejarias Artesanais Brasileiras. BBR. Brazilian Business Review, 16(4), 334-349. https://doi.org/10.15728/bbr.2019.16.4.2

Szrek, H., Chao, L. W., Ramlagan, S., & Peltzer, K. (2012). Predicting (un) healthy behavior: A comparison of risk-taking propensity measures. Judgment and Decision Making, 7(6), 716-727. https://doi.org/10.1017/S1930297500003260

Van der Vegt, R. G. (2018). A literature review on the relationship between risk governance and public engagement in relation to complex environmental issues. Journal of Risk Research, 21(11), 1-18. https://doi.org/10.1080/13669877.2017.1351466

Van Osch, S. M. C., & Stiggelbout, A. M. (2007). The development of the health-risk attitude scale. Van Osch, SMC. The Construction of Health State Utilities, 117-138. Available at https://openaccess.leidenuniv.nl/bitstream/handle/1887/12363/07.pdf?sequence captured in December 20th, 2017.

Vertakova, Y., Vselenskaya, I., & Plotnikov, V. (2021). Mergers and Acquisitions Risk Modeling. Journal of Risk and Financial Management, 14(9), 451. https://doi.org/10.3390/jrfm14090451

Vlek, C., & Stallen, P. J. (1980). Rational and personal aspects of risk. Acta Psychologica, 45(1), 273-300. https://doi.org/10.1016/0001-6918(80)90038-4

Weber, E. U., Blais, A.-R., & Betz, N. (2002). A domain-specific risk-attitude scale: Measuring risk perceptions and risk behaviors. Journal of Behavioral Decision Making, 15(4), 263-290. https://doi.org/10.1002/bdm.414

Williamson, P. (2016). Scrutinize C Removal methods: the viability and environmental risks Nature, 530(7589), 153-156. https://doi.org/10.1038/530153a

Willis, H. H. (2007). Guiding resource allocations based on terrorism risk. Risk Analysis, 27(3), 597-606. https://doi.org/10.1111/j.1539-6924.2007.00909.x

Wu, C. M., Schulz, E., Pleskac, T. J., & Speekenbrink, M. (2022). Time pressure changes how people explore and respond to uncertainty. Scientific Reports, 12(1), 1-14. https://doi.org/10.1038/s41598-022-07901-1

Wu, S., Powers, S., Zhu, W., & Hannun, Y. A. (2016). Substantial contribution of extrinsic risk factors to cancer development. Nature, 529(7584), 43-47. https://doi.org/10.1038/nature16166

Zheng, Y. (2013). The development of the risky financial behavior scale: A measure of financial risk tolerance. Master Dissertation. The university of Denver, Morgridge College of Education, Denver, CO. Available at https://digitalcommons.du.edu/cgi/viewcontent.cgi?article=1733&context=etd captured in December 20th, 2017.

Submetido:01/11/2021

Aceito:02/11/2022

Appendix A:

N=220 Papers found in Scopus using the searching string "Risk AND tim* OR temp*"

Brenner M., Izhakian Y., 2022; Lulli L.G., Giorgi G., Pandolfi C., Foti G., Finstad G.L., Arcangeli G., Mucci N., 2021; Pan, HF; Ha, HY, 2021; Giese, G; Nagy, Z; Lee, LE, 2021; Scherer B., Apel M., 2020; Lu W., Yeo B., 2020; Kieff F.S., 2020; Zhang, C; Nahrgang, JD; Ashford, SJ; DeRue, DS, 2020; Zhang W., Mei B., 2019; Le Bris, S; Madrid-Guijarro, A; Martin, DP, 2019; Zhang, ZL; Li, HY; Meng, F; Qiao, SC, 2018; Fattahi, M., Govindan, K., Keyvanshokooh, E. 2017; Jung, K.M. 2017; Teixeira da Silva, J. A., Dobránszki, J.2017; Mahmound, O.2017; Commandeur, J.J.F., Wesemann, P., Bijleveld, F., Chhoun, V., Sann, S.2017; Morri, G., Romito, F.2017; Rabie, M., El-Sayegh, S.2017; Mylnikov, L., Kuetz, M.2017; Csermely, T., Rabas, A.2016; Chen, C. Y. H., Chiang, T. C.2016; Makarowski, R., Makarowski, P., Smolicz, T., Plopa, M.2016; Bandaly, D., Satir, A., Shanker, L.2016; Costin, O., Gordy, M.B., Huang, M., Szerszen, P.J.2016; Ferecatu, A., Önçüler, A.2016; Ioannou, C.A., Sadeh, J.2016; Parrado-Martínez, P., Partal-Ureña, A., Gómez Fernández-Aguado, P.2016; Bernardi, M.2016; Yang, L., Chen, Z.P., Zhang, F.2016; Zhu, X.2016; Joshi, M.S., Zhu, D.2016; Chen, K., He, L.T., Lenin, R.B.2016; Amoozad Mahdiraji, H., Razavi Hajiagha, S.H., Hashemi, S.S., Zavadskas, E.K.2016; Jian, M., Fang, X., Jin, L.-Q., Rajapov, A.2015; Cataldo, J. M.2015; Angerer, S., Glätzle-Rützler, D., Lergetporer, P., Sutter, M.2015; Miller, K.L., Li, H., Zhou, T.G., Giamouridis, D.2015; Novak, J.2015; Hansen, K.R.N., Grunow, M.2015; Suksonghong, K., Jaroenwiriyakul, S.2015; Li, R., Guo, M.2015; Hu, Y., Wang, D., Pang, K., Xu, G., Guo, J.2015; Jackson, A.B., Gallery, G., Balatbat, M.C.A.2015; Fox, D.M., Martin, N., Carrega, P., (...), Tortorollo, N., Fox, E.A.2015; Brockman, P., Ma, T., Ye, J.2015; Forte, S., Lovreta, L.2015; Wu, W., McMillan, D.G.2014; Wentland, S., Waller, B., Brastow, R.2014; Aysun, U., Lee, S.2014; Ebert, S., Wiesen, D.2014; Liu, Y., Xie, C., She, S.2014; Bronk, C.2014; Dew-Becker, I.2014; Baumeister, C., Kilian, L.2014; D'Alpaos, C., Canesi, R.2014; Wu, W., McMillan, D.2013; Sukcharoensin, P.2013; Glova, J.2013; Guégan, D., Hassani, B.K.2013; Sun, C.2013; Levy, H., Wiener, Z.2013; Bolton, P., Chen, H., Wang, N.2013; Hsee, C.K., Zhang, J., Wang, L., Zhang, S.2013; Wachter, J.A.2013; Guo, H., Wang, Z., Yang, J.2013; Ning, H., Wang, J., Chen, W.2013; Prezelj, I., Žiberna, A.2013; Shi, T., Landriault, D.2013; Lin, J.C, Wu, Y.2013; Kurosaki, T., Kim, Y.S.2013; Glova, J., Pastor, D.2013; Kresta, A., Tichý, T.2012; Pošta, V.2012; Donelson, D.C., McInnis, J.M., Mergenthaler, R.D., Yu, Y.2012; Ko, K.J., Huang, Z.2012; Gibbs, M.T.2012; Chan, W.H., Feng, L.2012; Brady, J.T.2012; Moser, C., Stauffacher, M., Krütli, P., Scholz, R.W.2012; Waylen, P., Keellings, D., Qiu, Y.2012; She, S., Lu, Q., Ma, C.2012; Jourdan, S.

J.2012; Ewing, B.T., Thompson, M.A.2012; Shani, A., Reichel, A., Croes, R.2012; Saha, A., Malkiel, B.G.2012; Menchero, J., Davis, B.2011; Nguyen, Q.2011; Boguth, O., Carlson, M., Fisher, A., Simutin, M.2011; Christiansen, C., Ranaldo, A., Söderlind, P.2011; Berkman, H., Jacobsen, B., Lee, J.B.2011; Bhar, R., Lee, D.2011; Kuersten, W., Linde, R.2011; Carpenter, J.P., Garcia, J.R., Lum, J.K.2011; Liu, P.P., xu, K., Zhao, Y.2011; Fuchs, G., Reichel, A.2011; Koutmos, D.2011; Chen, L., Zhang, L.2011; Volis, A., Diamandis, P., Karathanassis, G.2011; Cherny, A. S.2010; Coble, K.H., Lusk, J.L.2010; Chang, C.-C., Ho, R.-J., Lee, C.2010; Le, A., Singleton, K.J., Dai, Q.2010; Cossette, H., Marceau, E., Maume-Deschamps, V.2010; Koijen, R.S.J., Nijman, T.E., Werker, B.J.M.2010; Park, S., Lee, T.-E., Sung, C.S.2010; Elangovan, D., Sundararaj, G., Devadasan, S.R., Karuppuswamy, P.2010; Staley, J. A.2009; Lochstoer, L. A.2009; Gebel, M., Giesecke, J.2009; Fugazza, C., Guidolin, M., Nicodano, G.2009; Berger, D., Turtle, H.J.2009; Dedieu, F.2009; Haque, M., Kouki, I.2009; Booij, A.S., van Praag, B.M.S.2009; Baker, J., Shaw, W.D., Riddel, M., Woodward, R.T.2009; Cooper, I., Priestley, R.2009; Cherny, A.S.2009; Watanabe, A., Watanabe, M.2008; Guillén, M., Pinquet, J. 2008; Güth, W., Levati, M.V., Ploner, M. 2008; Thampi, K.K., Jacob, M.J.2008; Dahl, M.2007; Foo, T.F., Deng, L., Wang, H.2007; Lin, W.-C., Lu, J.-R.2007; Romilly, P.2007; Gregory, R.P.2007; Onay, S., Öncüler, A.2007; Bradley, J.2007; Worthington, A., Higgs, H.2006; Hiang Liow, K., Huang, Q.2006; Najand, M., Lin, C.Y., Fitzgerald, E.2006; Bramante, R., Gabbi, G.2006; Tourani-Rad, A., Choi, D.F.S., Wilson, B.J.2006; Evans, K.P., Speight, A.E.H.2006; Thomas, D.J., Tyworth, J.E.2006; Artemeva, N.2005; D'Addio, A.C., Rosholm, M.2005; Chue, T.K.2005; Ferreira, M.A., Gama, P.M.2005; Stanford, D.A., Avram, F., Badescu, A.L., (...), Silva Soares, A.D., Latouche, G.2005; Dickson, D.C.M., Willmot, G.E.2005; Schroder, M.2004; Chandran, S., Menon, G.2004; Coram, P., Ng, J., Woodliff, D.R. 2004; Wagner, N.2004; Foo Sing, T., Liang Tang, W.2004; Seetharaman, P.B.2004; Avram, F., Usábel, M.2004; Picone, G., Sloan, F., Taylor Jr., D.2004; Canova, F., de Nicoló, G.2003; Davidson, D.J.2003; Fung, H.-G., Xu, X.E., Yau, J.2002; Lally, M.2002; Dai, Q., Singleton, K.J.2002; Dickson, D.C.M., Waters, H.R.2002; Pan, J.2002; Kurosaki, T.2000; Chang, J.-R., Hung, M.-W.2000; Hansson, B., Persson, M.2000; Faff, R.W., Hillier, D., Hillier, J.2000; Angelini, P.2000; Chesson, H., Viscusi, W.K.2000; Milevsky, M.A.1999; Fong, H.G., Lin, K.-C.1999; Lewellen, J.1999; Houston, R.W.1999; Van Der Meer, R., Smink, M.1999; Bernstein, P.L.1999; Campbell, C.J., Kazemi, H.B., Nanisetty, P.1999; Gallo, G.M., Pacini, B.1998; Labuschagne, L., Eloff, J.H.P.1998; Lien, D., Tse, Y.K.1998; Faff, R.W., Brooks, R.D.1998; Kakhandiki, A., Shah, H.1998; Ghysels, E.1998; Samuelson, P.A.1997; Pritsker, M.1997; Kryzanowski, L., Lalancette, S., To, M.C.1997; De Santis, G., Gerard, B.1997; Baum, C.F., Barkoulas, J.1996; Nanisetty, P., Bharati, R., Gupta, M.1996; Bekaert, G.1996; Kho, B.-C.1996; Richard, R., Van Der Pligt, J., De Vries, N.1996; Gagnon, L., Lypny, G.1995; Alles, L.A.1995; Weiserbs, B., Gottlieb, J.1995; Quiggin, J., Horowitz, J.1995; Evans, M.D.D.1994; Clinebell, J.M., Kahl, D.R., Stevens, J.L.1994; Turtle, H., Buse, A., Korkie, B.1994; Jones, S.L.1993; Chesney, M., Elliott, R.J., Madan, D., Yang, H. 1993; Faff, R.W., Lee, J.H.H., Fry, T.R.L.1992; Bessembinder, H., Chan, K.1992; Bodurtha, J.N., Mark, N.C.1991; Melvin, M., Sultan, J.1990; Chang, E.C., Huang, R.D.1990; Mehrez, ;A., Gafni, A. 1990; Ferson, W.E.1990; Hill, J., Schneeweis, T., Yau, J.1990; Giovannini, A., Jorion, P.1989; Ahn, C.M.1989; Mark, N.C.1988; Rodriguez, R.J.1988; Ferson, W.E., Kandel, S., Stambaugh, R.F.1987; Abikhalil, F.1986; Pfeifer, P.E.1985; Bernhard, R.H.1984; Alexander, G.J., Benson, P.G., Eger, C.E. 1982; Karady, G.G.1982; Beedles, W.L., Joy, O.M.1982; Chen, S.-N.1982; Leonard, D.C., Noble, N.R.1981; Fuller, R.J., Kim, S.-

H.1980; Chen, S.-N.1980; Kon, S.J., Jen, F.C.1978; Falk, H., Heintp, J.A.1977; Hasty, J.M., Fielitz, B.D.1975; Mokkelbost, P.B.1971.

Appendix B:

N=11 Papers found in Scopus using the searching string "Risk strategy AND tim* OR temp*"

Nouri Gharahasanlou, A., Ataei, M., Khalokakaie, R., Barabadi, A., Einian, V.2017; Taki, P., Barzinpour, F., Teimoury, E.2016; Chen, S., Wang, X., Deng, Y., Zeng, Y.2016; Li, D., Rong, X., Zhao, H.2015; Li, Y., Li, Z.2013; Mishura, Y., Schmidli, H.2012; Christiansen, C., Ranaldo, A., Söderlind, P.2011; Fuchs, G., Reichel, A.2011; Chen, A.2008; Frey, R., Runggaldier, W.J.1999; Jones, S.L.1993; Svenson, O.1985
Note: The authors can send a complete list and full references for the sample.