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RISKS MANAGEMENT - EVALUATION AND MINIMIZATION. SCREENING ARTICLE

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Abstract: Risk assessment and the idea of risk have a long history. Risk assessment and risk management procedures have changed from generation to generation since then. The risk area has two main responsibilities: (I) use risk assessments and risk management to study and address the risk of specific activities (e.g., the operation of an installation or an investment); and (II) conduct generic risk research and development, including concepts, theories, frameworks, approaches, principles, methods, and models to understand, assess, characterize, communicate, and (broadly) manage risk. The Generic Part (II) introduces the concepts and techniques for assessment and management that may be used to the evaluation and management of individual challenges (I). We conclude that there is still some shakiness in the scientific foundations for risk management, which implies that both theoretical and practical work is based on perspectives and notions that might lead to serious errors by decision-makers, such as perception/attitude.

Keywords: evaluation, managerial processes, risk

1 INTRODUCTION

A company's financial performance can be significantly impacted positively or negatively by an effective risk management system. To improve the decision-making process, working and simulation methodologies were investigated in this research. It is the goal of this essay to examine the role and contribution of risk management approaches such as appraisal and minimization. After completing a comprehensive assessment of the available literature, researchers held talks and conducted analyses to better understand the subject matter. Risk management stages, assessment methodologies, and optimization were shown to have a significant methodological disconnection. As many articles as have been written about the subject, this gap shows the limits of numerous models of dynamic representation and the complexity of hazards in firms' economic activities, particularly in real-world / real-time

applications. The decision-making process might be aided by flexible and hybrid simulation-based optimization models for risk management. As a follow-up to this, new applications based on simulation and optimization techniques are presented in order to counteract the hazards that have been identified.

The concept of risk and risk assessment has a long history. More than 2400 years ago, Athenians assessed risks before making decisions (Berstein, 1996) From then until today, risk assessment and risk management processes have evolved from one generalization to another. scientific fields at relatively recent dates, no more than 40-45 years.

Half a century ago we saw the first scientific journals, papers and conferences covering fundamental ideas and principles on how to properly assess and manage risk. To a large extent, these ideas and principles form the basis for today's field - they have been the foundation for risk assessment and management practices since the 1970s and 1980s.

Despite the fact that the research process and general risk studies essentially define the science of risk, applications might be considered academic if they add to new information, such as a greater understanding of how a specific technique of assessment can be put into reality. (Hasson, SO & Aven, T., 2014), (Hollnagel, 2014), (Hale, 2014), (Le Coze, J.-C., Pettersen, K., & Reiman, T., 2014), and (Aven What is safety science? 2014) are some of the authors who have made significant contributions to the clarification of the content of the risk domain and its academic foundation.

We must distinguish between the risk area that encompasses all relevant educational programs, journals, researchers, research groups, and societies, among other things (which can be referred to as risk discipline) and the risk area that encompasses the generation of knowledge (also known as knowledge generation). According to Hasson (2013), science (academics) supplies us with the most widely accepted epistemic claims, for example, by publishing articles on risks in peer-reviewed journals, which contribute to the growth of risk research.

2 CONCEPTUALIZING THE RISK

The word "risk" has been traced back to the language of Oc, in the Byzantine Empire; in the writings of Homer (when referring to the travels of Odysseus, the passage between Scylla and Caribbea), the Greek word "rizikon" is used; and can be conceptually identified with a term derived from maritime vocabulary (shipping companies identified as a "risky situation" for a ship the situation in which it had to split vertical waves (Cortellini, E. & Tofan, I., 2011).

In the explanatory dictionary of the Romanian language, risk is described as "the chance of coming into contact with a hazard, of having to deal with a problem, or of suffering a loss; potential danger" (from the French risk) (Explanatory Dictionary of the Romanian Language). In the majority of economic literature, the term "risk" refers to a negative divergence from the plan or forecast (Maylor, 2010).

In the financial industry, the risk is associated with the risk of making an investment or taking out a loan (Encyclopedia Britannica).

2.1 Risk definition - a conundrum for authors

Risk is a term that is handled in every field, whether it is finance, engineering, health, transportation, security, or supply chain management (Althaus, 2005), and it is a source of concern. Risk, in the author's opinion, refers to uncertainty or the possibility that an unpleasant occurrence will occur and significantly impact activities or systems.

Risk is an ephemeral idea with commercial and financial roots and influenced by military, scientific, and psychological terminology.

With the growth of scientific risk assessment methodologies, the corporation has began to pay close attention to disagreements over the acceptance of risk assessment and its evaluation. Thus, the idea of risk has been extended to a variety of domains within modern society's systems.

The first definition of risk understood as a possibility of loss is found in 1711 in the work of Abraham DeMoivre, "De Mensura Sortis": "the risk of losing a certain amount is the opposite of the expectation loses "(de Moivre, 1711).

Professors Chapman and Cooper define risk as the possibility of suffering economic, financial, or material damage as a result of an inherent uncertainty associated with the action taken (Chapman, C.B.and Cooper, D.F., 1983).

Risk (Dobrotă, 1999) means "the probability of an unwanted event occurring". "The risk is equivalent to the vulnerability of the company, which can occur in all sectors (commercial, technical, human, financial, etc.) so that its analysis involved numerous researches, which would highlight the weaknesses of economic and financial activity." (Hada, 1999). "The risk stems from people's inability to know the future and is perceived when the possible outcomes of actions have been associated with a significant degree of uncertainty." (Luban, 2000). "Risk, in a general sense, means the variability of the result obtained under environmental pressure, more precisely we can appreciate that the risk represents the potential damage to which the patrimony, interests and activity of the economic agent are exposed". (Ilieși, 2006).

Another approach, that of Ionescu, defines risk as the possibility that future revenues may be different from those estimated to be obtained, more precisely, "risk is the variability of revenues under the influence of the environment, implying the possibility of an unfavorable event." (Ionescu, 2005).

2.2 The significance of risk classification

It is the most frequent risk categorization, and it is based on the frequency of occurrence, the severity of the effects, and the type of the risk.

Country risk (macroeconomic - the overall status of a country), regional risk (a geographical area), and microeconomic risk are the three basic theoretical and conceptual levels for identifying risk by degree of aggregation (at the level of economic agents).

Dealing with the context: economic, social, and political, is another typical approach to risk. Economic risk, for example, is defined by the overall status of economic systems (a damage, a loss in an economic activity, operation or action). Societal risk is primarily defined by social needs, whereas political risk is primarily concerned with political instability.

Economic risk, on the other hand, might be objective or subjective. "Variation in expected outcomes and is an individual-independent variable" is how objective risk is defined. (Nistor, et al., 2002). Estimating a "objective and depends on the individual, his information, his temperament, and his attitude" is what subjective risk is all about. (I. Stancioiu and Gh. Militaru, 1998).

Risk is categorised at the microeconomic level according to the location of its producing sources, therefore there are external and internal risks to the organization.

Internal risk is rooted in the unique characteristics of each business, and is strongly linked to the management, organization, and growth of the business's operations, as well as the quality of management actions (production, commercial, financial, marketing, and people) and implementation. This type of risk is usually caused by a managerial action (overpopulation with tasks, unconnected multiple decision-making system, organizational inconsistency and inconsistency, lack of a unitary idea, etc.).

External risk arises as a result of variables beyond the company's control (political risk, currency risk, natural risks, interest rate risk, market risk - beta or systematic).

Risks can be probable, plausible, hypothetical, or imaginary in terms of their likelihood of occurrence, with losses that are ordinarily, reasonably, theoretically possible, or even improbable to occur.

The risks might be short-term, financial, operational, or strategic, depending on their nature.

Risks are grouped into three categories based on their impact and likelihood of occurrence: high impact and high probability

risks, high impact and low probability risks, and low impact and high probability risks.

2.3 Risk within organizations

People, on the average, prefer to avoid risk, but the economy as a whole pushes firms to take chances. Business operations, or the actions of extracting cash from one source and transferring it to another, entail incurring risks in exchange for greater earnings.

Taking risks leads to competition and creativity in one way or another. As a result, risks are concerns that must be acknowledged, prepared for, and improved through organized management strategies.

Because of the complexity and size of the risks that businesses confront, academics has determined the necessity to divide risks into two groups (Mowbray, A.M., Blanchard, R.H., & Williams, C.A., 1979). To begin with, a clean risk, also known as a static risk, is one that produces damage without the prospect of profit, is defined by negative qualities, is unpredictable, and is created by unintentional occurrences. Then there is the speculative or dynamic risk, which can result in loss or gain. These risks are usually connected to the planning and administration of the business, such as manufacturing, product, marketing, and sales, and are often entrepreneurial in nature, such as a non-profit investment.

Risks in organizations can be caused by external factors (economic, social, political and technological aspects) or internal factors (infrastructure, human resources, processes and technology used by a company) ((COSO), 2004).

Table 1presents a variety of types of risks that most organizations face:

Table 1. Common Types of Business Risk (David, L. Olson & Desheng, D. Wu, 2008)

External environment	Business strategies and policies	Execution process
• Competitors • Legal regulatory framework • Natural disasters • Medical costs / usage trends • Customer expectations	• Strategy and innovation • Capital allocation • Business / product portfolio • Organization chart • Organization policies	• Planning • Processes / technology • Technological implementation and continuity • Suppliers / partner trust • Customer satisfaction • Compliance with regulations and confidentiality • Intellectual capital • Integration for change
People	Analysis & reporting	Technology & data
• Leadership • Skills and competencies • Adaptability • Communication • Performance criteria • Responsibility • Fraud and abuse	• Performance Management • Budgeting / Financial Planning • Accounting / Tax Information • External Reports and Disclosures • Pricing / Profit • Market Intelligence • Contractual Commitments	• Technological and architectural infrastructure • Relevance and integrity of data • Integrity of data processing • Technological reliability • Security of information systems

3 RISK ASSESSMENT

The goal of the risk assessment process is to gather necessary responses in order to assure a given ranking in order of priority, which entails calculating the likelihood of materialization, as well as the potential impact on objectives or activities, if it occurs.

In this context, risk assessment entails constructing a hierarchy in respect to the criteria included in the assessment process, factors that may be connected to risk tolerance, for example.

3.1 Uncertainty - the basis for conceptualizing risks

Uncertainty is a crucial notion in risk conceptualization and assessment.

Since the 1970s, there has been a heated discussion in the literature about how to understand and cope with ambiguity. (Flage, R., Aven, T., Baraldi, P., & Zio, E., 2014) provide us a recent viewpoint on the problems, difficulties, and future directions in risk assessment in terms of the nature of uncertainty.

It is important to remember that "uncertainty" is a far larger concept than "risk," and that "risk" is simply one component of "uncertainty." For example, "risk" is a phrase used to indicate known likely instances, but "uncertainty" is when we can not compute probabilities or assume any hypothesis (Knight, 2006). The effort to forecast the evolution of the capital market over the next fifty years is an example of uncertainty. In statistical probability, risks and uncertainties are frequently considered independently (Ritholtz, 2012). Risk and uncertainty, regardless of industry, can have a beneficial or negative influence on company and require proper management.

Spiegelhalter and Riesch (Spiegelhalter, D., J., & Riesch, H., 2014) present five degrees of uncertainty: event, parameter, and model uncertainty, as well as two additional levels of known and unknown process errors. modeling, which may include arguments on the problem's phrasing. The examination of the relevance of uncertainty is a fundamental area of uncertainty in risk assessment, according to (Borgonovo, 2007), (Baraldi, P., Zio, E., & Compare, M., 2009), and (Aven, T., & Nokland, T., E., 2010). They face a new form of combined set of measures based on conventional importance and related uncertainties in order to identify the most crucial and vital elements that lead to the occurrence of uncertainties and risks.

The choice is management's "specialty." Any managerial choice must be based on both historical and current data, as well as projections of how the phenomena and processes that make up the decision-making issue could evolve in the future. Because the prediction is estimative and appreciative, the decisions' outcomes are subject to a higher or lower degree of uncertainty. As a result, there are two terms: certainty, which represents in a pragmatic manner circumstances in which anticipations have a single value, and uncertainty, which describes in a pragmatic way situations in which anticipations have several values.

Uncertainty refers to conditions or situations in which anticipations might have a wide range of values assigned to them on an anticipatory interval.

Decisions are made in the microeconomy, as elsewhere, in conditions of uncertainty in the majority of cases. The reason stems from the fact that technological growth occurs under unique circumstances, making it impossible for producers to predict the level of output that would correspond to a certain combination of production elements. Consumers must also contend with the unpredictability of shifting market conditions, disposable money, mood and preferences, and so forth.

Anticipations in the decision-making process can be considered to have no one value.

Uncertainty and risk must be seen in tandem.

3.2 Measuring and managing risk

Bernoulli suggested in 1738 that risk be measured using the geometric mean and that risk be minimized by distributing it among a group of independent occurrences (Beronoulli, 1954). As a result, risk measurement requires the use of two combined variables: a) the frequency of occurrence (probability) of the "hazardous" event, i.e. the number of times the

risky event occurs during a set period, and b) the size of the event's effects (magnitude).

To define or assess how high or low the danger is, several values are utilized.

Value risk / description indicators:

a) The combination of probability and magnitude / severity of the consequences,

b) The triplet (Si, Pi, Ci), where Si is the scenario for i, Pi is the probability of that scenario, and Ci is the consequence scenario i, where i = 1,2, ... N.

c) The triplet (C ', Q, K), where C' is a series of specified consequences, Q represents a measure of the uncertainty associated with C '(probability) and K is the basic knowledge that supports C 'and Q (which includes a judgment of the power of this knowledge).

d) Expected consequences (damages, losses), for example calculated by: i. Estimated number of deaths in a given period of time or estimated number of deaths per unit time of exposure. ii. The product of the probability of occurrence of the danger and the probability that the object will be exposed, given the expected danger and damage, given that the danger and the object are exposed to it (the last term is an indicator of vulnerability). iii. Expected solubility.

e) Possibility of distribution of damages (for example, a distribution of triangular possibilities).

Figure 1. Stages of the risk management system (source: www.vanguardresources.com)

Risk management involves six essential steps (see fig.1):

a) description of the context,

b) identification of risks,

c) analysis and ranking of risks,

d) development of the risk management plan,

e) implementation of the risk management plan,

f) monitoring and updating the initial management plan risk management**.**

The International Risk Managers International Association defines risk management as "the art of making decisions in a world controlled by uncertainty." Risk management, in other words, is the act of recognizing, assessing, and responding to the hazards that an organization faces. The investigation of the company's internal and external surroundings is referred to as "exposing the organization."

A lesser known element of risk management is the risk associated with this process. Among the errors that cause substantial losses for managers in charge of coordinating the risk department, we mention:

- erroneous assessment or mobilization of significant funds to cover risks inappropriate for the activity;

- overpopulation of a segment owing to inadequate risk management and uncontrolled transfer;

- erroneous assessment or mobilization of significant funds to cover risks unsuitable for the activity.

4 METHODS AND TOOLS FOR MINIMIZING MANAGERIAL RISKS

Risk identification is an action that must be done on a regular basis as part of the process of reducing management hazards.

Different approaches may be used to identify the risk:

- Risk-related checklists (anticipated outcomes, design and execution mistakes and omissions, environmental conditions, cost estimates, execution deadlines, etc.);

- Document analysis in the archive to discover recurring issues;
- Making use of the direct-involved staff's knowledge (department and team leaders;
- Designation of a person in charge of recognizing externally imposed hazards (essential changes in legislation, economic changes, technology, etc.).

Following the risk identification phase, we go on to the risk analysis phase, which employs a number of mathematical methods, ranging from the most basic - probabilistic analysis - to the most complicated - Monte Carlo analysis. Some of the most well-known risk management strategies and tools are included in the table below.

Table 2. Risk management methods and tools

Risk management methods and tools	
Expected Value (VA) Method	The simplest method of quantifying the risks VA (a) = P (a) x E (a), where VA (a) = expected value of the event (a) P (a) = probability of occurrence of the event (a) E (a) = effect of the occurrence of the phenomenon (a)
Simulations (Monte Carlo)	Advanced risk quantification method, uses a model of a system to analyze the performance or behavior of the system and simulates the achievement of objectives a large number of times, providing a statistical distribution of results
Decision trees	Tools that describe the key interactions between decisions and random events, as perceived by decision makers; tree branches represent either decisions (squares) or random or uncertain results (circles)
Risk reduction	Scheduling (in case of execution risks, scientific scheduling of activities using network graphics), training (reduces the probability of accidents and their effect) and redesign (work teams, material flow, workforce).
Risk sharing	Partial or full distribution of responsibilities for the consequences of the risk of one or more entities, depending on the risk behavior of the various structures involved and the allocation of risk to the entity that can best bear and control it.
Butterfly analysis	A simple, diagrammatic way of describing and analyzing the path of a risk from hazards to consequences and analyzing the means of control. It is a combination of fault tree logic and event tree analysis
Bayes analysis	Statistical procedure that uses previous distribution data to assess the probability of the outcome and models the cause-effect relationships in a variety of domains by capturing the probabilistic relationships of the variable inputs to deduce a result
Markov analysis	Used in the analysis of complex repairable systems that can exist in multiple states, including various states of degradation
Cost benefit analysis	Used for risk assessment where the total expected costs are weighed against the total expected benefits to choose the best or most profitable option.
Consequence / probability matrix	How to combine qualitative or semi-quantitative rankings of consequences and probabilities to obtain a ranking of the level of risk or risk, the format depends on the context in which it is used and it is vital to use a design appropriate to the circumstances

Risk minimization appears to be a generic concept in certain works, in the sense that it is applicable to a wide range of situations, but there are various levels of generality.

Some research may just or largely address one area of application, yet it is nevertheless necessary for all sorts of applications in those

areas. For example, a study on how to appropriately conceive risk in a business would have only a small audience outside of this subject.

5 GAPS COVERD

In this review's risk classification, some hazards, such as logistical concerns, do not suit particularly well. There has been no comprehensive study of the assessment process as a whole. Although we have established the risk demand and the risk inventory, new risk measures might be developed for evaluation and mitigation.

The lack of a relationship between risk management approaches, risk impact / effects, and risk measurements connected to the company's profile was spotted by us. As a result of this separation, we have attempted to reply to it in this work. Risk response methods, risk solution techniques, and the risk preference profile of firms are also out of sync.

Risk response strategies, in our opinion, should be based on proven methods for reducing the most serious threats. Redundancy and redundancy, agility, adaptability, business continuity planning, and other challenges were not implemented as risk remedies. We have not found a methodical approach to tying optimization objectives to performance outcomes.

More research is needed into how risk assessment and response are intertwined and how their advantages might be replicated. The new business models might benefit from modern optimization methodologies, which were not found in our research.

Other sorts of simulations might be created to assist decision-making due to the complexity of possible risk circumstances. Multivariate models applied to risk preferences did not use a weighted approach. When it comes to risk reduction, the writers may have spent more time focusing on the resilience of firms.

6 CONCLUSIONS AND FUTURE DIRECTIONS

Risk management is a scientific discipline that contributes significantly to the support of decision-making in practice.

In some ways, the scientific foundation for risk management is still a bit hazy, which means that both theoretical and practical work is founded on viewpoints and concepts that might lead to major errors by decision-makers, such as perception / attitude. Risk assessment as an estimated value or a probability distribution

In recent years, a number of integrative studies have been completed that have developed wider views on conceptualization, risk assessment, and management.

These viewpoints apply to:

- ideas and terminology like risk, vulnerability, likelihood, and so on.
- how risk thinking is combined with the principles and methods of robustness and resilience in risk assessments
- the lack of descriptions and characteristics of knowledge in risk assessments
- how uncertainty is treated in risk assessments
- how risk thinking is combined with the principles and methods of robustness and resilience in risk assessments
- recognize the need of managerial judgment and review in risk management.

Developing a conceptual framework for risk assessment and mitigation is a critical first step. An empirical examination of the theoretical framework using action research is one of our future research objectives, as outlined in this study.

Conversations we have had with some of the area's largest industrial firms suggest a keen interest in and willingness to fund this kind of study.

For example, we recommend that researchers follow the step-by-step techniques outlined in this article when implementing and validating real-world models. Through the metamodeling method, we propose enhancing the simulation-based optimization viewpoint. Using the risk optimization methodology, one may compare it to other approaches described in the literature.

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