

# Supply chain innovation between risk and competitive advantage.

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**Abstract-** *The purpose of this study is to examine the impact of innovation on supply chains, however innovation means taking risks. Innovation is of course a source of competitive advantage, but on the other hand, the implementation of innovation also creates risks because it is difficult to separate risk from innovation. In our research, we compiled a non-exhaustive list of risks companies may face in supply chain innovation projects.*

**Keywords—***Innovation; Supply chain; Risk, Supply chain risk; Supply chain innovation.*

## I. INTRODUCTION

Innovation is the only concept that has not been obsolete and will never be [1]. The strong competitive pressure of the last decade has brought innovation to the top of the agenda for business leaders [2]. In times of economic recession, innovation can help turn a crisis into an opportunity [3]. From this perspective, innovation is the search for, discovery, development, improvement, adoption, and commercialization of new processes, new products, and new organizational structures and procedures. It involves uncertainty, risk-taking, exploration and disapproval, experimentation and testing [4]. In fact, innovation in logistics and SCM has existed throughout history, people, organizations, companies, and even governments

have searched for new ways to manufacture, package, transport, store, and handle goods. Process innovations have also regularly transformed the way we procure, produce and distribute, but also support and recover certain products [5]. However, while innovation is important for competitiveness, it can expose firms to survival risks [6]. It should be noted that risk is at the heart of innovation, but it is often not managed adequately [3]. Innovation and risk are inseparable. In fact, the innovation management literature often recommends that innovation-driven firms should actively monitor, assess, analyze, and address future events to mitigate risk to the extent possible [7].

## II. LITERATURE REVIEW

### 1. Innovation :

According to Schumpeter, innovation is a process of industrial mutation, that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one [8]. In the same way, according to Twiss, innovation is a process that combines science,

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technology, economics and management, as it is to achieve novelty and extends from the emergence of the idea to its commercialization in the form of production, exchange, consumption [9].

### **2. Supply chain Innovation :**

Supply chain represents the necessary steps taken to deliver a product or service to customers. According to supply chain council, these steps can be managed with the help of the SCOR model that consist of the Plan, Source, Make, Deliver, Return processes [10]. Innovation in logistics and SCM has always existed. People, organizations, companies and even governments have always looked for new ways to manufacture, pack and transport goods, to store them and to handle them. Process innovations have also regularly transformed the way of sourcing, producing and distributing, but also of supporting and recovering certain products [11]. The innovation in logistics has been conceptualized by Arlbjørn [12] into three main components: business process, network structure, and technology. They define supply chain innovation as: a change (incremental or radical) within a supply chain network, supply chain technology, or supply chain process (or a combination of these) that can take place in a company function, within a company, in an industry or in a supply chain in order to enhance new value creation for the stakeholder [12]. Furthermore, supply chain is a function where the scope of innovation remains too high in order to adapt to customer requirements and ensure a level of service at the lowest cost. Supply chain innovations are a combination of information and related technology development and new

marketing and logistics procedures to improve service efficiency, improve operational efficiency, increase revenues, and maximize joint profits [13]. In this perspective, Prahalad and Krishnan integrated innovation into the definition of supply chain management (SCM) in 2008, highlighting its value: "SCM is a domain for creating competitive advantage through innovation. To be successful in the competitive landscape [14]. Here are 10 business innovations that are positively impacting the industry :

- Data analytics,
- Transport management software,
- Radio frequency identification,
- Geolocalisation,
- Robotic process automation,
- Augmented reality inspections,
- 3D Printing,
- Crowdshipping,
- Alternative fuels,
- Driveless Vehicles [15].

As a result, Any model of the innovation process must incorporate failure as a likely outcome [3] (Bowers and Khorakian 2014). In this context, the environment in which we live and, more generally, the socio-economic space in which companies evolve is, by nature, risky. Wealth production is systematically correlated with risk production.

### **3. Supply chain risk :**

Risk is an area that has been the subject of much debate in recent decades. Several definitions have been proposed in the literature, including both desirable and undesirable unexpected outcomes. In addition, risk is the probability, in quantitative terms, that a defined hazard will occur. It thus combines a probabilistic measure of

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the occurrence of the primary events with a measure of the consequences of that event or those events [16]. Jüttner defines supply chain risk as anything that presents an obstacle or hazard to the flow of information, materials, and products between the original suppliers and the delivery of the final product to the end users [17]. From this perspective, Zsidisin, Panelli, and Upton define supply risk as "the sweating of significant and/or disappointing failures with incoming goods and services [18]. Most risk research proposes the following (or similar) steps for risk reduction: risk identification, risk analysis, risk reduction/management, and risk control [19]. One of the key features of supply chain risk management (SCRM) compared to traditional risk management is that it is characterized by a cross-company focus on identifying and reducing risks not only at the company level, but also across the entire supply chain. However, companies that understand the importance of supply chain risk often do not know where to begin to address it Cited by [17].

### **III. RESEARCH METHODOLOGY :**

To study the concept of supply chain innovation, a systematic literature review method was adopted. This technique uses a systematic approach to identifying, selecting, and critically evaluating a body of knowledge on a clearly articulated topic. Unlike traditional literature reviews, which may be influenced by reviewers' familiarity or preferences, systematic literature reviews allow researchers to collect, analyze, and interpret the full set of available literature thoroughly and impartially.

Systematic review techniques are particularly relevant for the purposes of this paper. By

avoiding the biases of traditional literature searches, systematic reviews allow researchers to summarize accumulated knowledge on topics of interest; examine topics from different perspectives; and develop reliable knowledge from widely researched knowledge bases. Thus, a systematic review of the topic of innovation allows us to comprehensively explore the existing literature, elucidate the implications and determinants of supply chain innovation, bridge the gap between different perspectives, and generate a broad understanding of the research topic.

The application of systematic review techniques involves five stages: question formation; literature research; literature selection and evaluation; research analysis and interpretation; results presentation [20]. The question addressed in this paper is as follows: Given that the knowledge base of innovation is scattered across disciplines, can we develop a comprehensive framework for understanding supply chain innovation between risks and competitive advantage. Literature searches were performed by querying the Scopus dataset, one of the largest repositories of scientific articles. The literature search consisted of five stages. In the first phase, a key search was conducted using the words ("innovation") and ("supply chain management" or "supply chain risk management") in papers and conference proceedings published in 1950 (the earliest available year in the dataset) and December 2021. In the second phase, studies are selected and evaluated according to a specific set of criteria related to the relevance of the study to the research question and the quality of the study. The key assessment skills programme checklist is used to assess the quality of research. A

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preliminary analysis of selected studies was performed to identify common patterns among them. The analysis shows that research can be grouped into three areas: supply chain innovation, supply chain risk, and competitive advantage. In the third stage, the dataset is further queried using keywords related to these domains. In the fourth stage, the search results are evaluated according to the relevancy and quality criteria used in the second stage. All queries also take into account join synonyms such as "innovation" or "risk".

#### **IV. HOW TO MANAGE SUPPLY CHAIN INNOVATION RISKS :**

According to Sodhi, Son, and Tang [21], a supply chain is an interconnected network of organizations that includes suppliers, manufacturers, logistics providers, wholesalers, distributors, and retailers that aim to manufacture and deliver products or services to end customers business. Furthermore, global supply chains face different types of risks that increase with globalization[22]. Risk in a supply chain is a potential change that affects the result of a decline in the added value of each activity unit in the chain, which is described by the quantity and quality of goods at each location and time in the supply chain flow [22].

One of the key features of supply chain risk management (SCRM) compared to traditional risk management is that it is characterized by an enterprise-wide focus on identifying and mitigating risks not only at the enterprise level, but throughout the supply chain. However, companies that understand the importance of supply chain risk often do not know where to begin to address it [17].

##### **1. Risk Identification**

The most challenging step is undoubtedly identifying the risks [23]. The process begins with identifying the internal and external environments. Companies may mistakenly

overlook internal risks. These can be those posed by a dishonest employee, as well as those posed by inadequate policies.[24] Within this framework, There are essentially two types of approaches to supply chain risk identification. The first is based on brainstorming [25].The second approach to supply chain risk identification is based on taxonomies [17]. Although organizations are often unable to manage the source of risk exposure, it is critical to identify the sources of potential problems and the possible consequences. [19]. In this regard, the risk identification step of the supply chain risk management process is critical to the success of supply chain risk management [26], as it identifies the organization's exposure to uncertainty by ensuring that all significant activities within the organization have been identified and all risks arising from those activities have been defined [27].

##### **2. Risk Analysis**

Risk analysis, also known as risk assessment, is the process of qualitatively and quantitatively evaluating potential risks in a supply chain. It should be noted that risk analysis is an approach to identify and analyze supply chain risks is developed. It incorporates a process map prepared using the supply chain operations reference model (SCOR model), key performance indicators (KPIs) measuring the effects of the occurrence of risk events, and conventional risk management tools such as the risk allocation structure and risk allocation matrix [17]. To this end Sheffi (2005) uses qualitative estimates for both dimensions. To be more specific, the probability of occurrence can take on two levels, "high" and "low," and similarly, the severity of the impact can be "severe" or "mild [17].

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### 3. Risk Treatment

According to COSO, "Once risks have been assessed, management determines how to treat each risk. The different possible solutions are: avoidance, reduction, sharing and acceptance. Depending on the solution chosen, the effect of the different solutions should be considered in terms of probability and impact, as well as costs and benefits.

### 4. Risk Mitigation

The main results of the studies suggest that risk mitigation policies not only improve the control of the supply chain by maintaining and improving its market share, but also benefit the customers by stabilizing the retail prices in the market [28]. Based on the above and in general, in any innovation process a set of important steps must be carefully managed in order to ensure the success of the project and to limit all the risks that can hinder the smooth functioning of the process. These risks come from 5 important steps, which are:

- The idea or discovery (not bringing up an idea Missing an existing good idea Failing to formulate a relevant concept) ;
- The developement of the project (making inappropriate choices of targets - Never finding a realistic opportunity ;
- The developement (Make an unrealistic prototype (simplistic, inappropriate - Experimenting in an unrealistic context in relation to operating and/or usage conditions- Lack of convincing results at the end of the experiments) ;
- The introduction : - Failure of commercial testing - Lack of adoption decision by the "targets - Underestimation of the obstacles to the adoption and use of the innovation - Existence of conflicts between actors related to the innovation ;

- The diffusion : - Gap between expected benefit (see motivations) and result - Inability to exploit its full potential - Perverse effects of innovation – increased sc vulnerability due to the innovation ;

On April 23, 1985, Roberto Goizueta, then CEO of The Coca-Cola Company, announced a major event about the famous soft drink, which also turned out to be the biggest risk in Coca-Cola's history. After 100 years of an unchanged historical recipe, the company will launch New Coke. This change to the historic drink will cause a public and media outcry. A hotline dedicated to the new drink will be flooded with calls from disgruntled consumers, and calls for a boycott will multiply in the country. This resulted in a significant loss of market share to its competitor Pepsi.

## V. THE OBSTACLES TO THE ADOPTION OF INNOVATION IN A SUPPLY CHAIN :

Some errors can also be explained by underestimating (or even not anticipating) barriers to innovation absorption (and diffusion). Some examples from logistics and SCM to illustrate obstacles:

- Organisational and political : (e.g. not all companies are structured to innovate, nor do they have sufficient skills to engage in this type of project, management does not always support innovation projects, public authorities do not always support companies' innovation efforts).
- Related to the lack of knowledge : to envisage, test and deploy innovations that require advanced knowledge (e.g. big data, cryptography).
- Financial : to support the innovation effort or to adopt and deploy certain innovations (e.g. heavy investments and lack of rapid ROI slow down robotisation in logistics, especially if it is not flexible and adaptable enough).



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- Techniques : related to the need for support resources (e.g. the lack of sockets for recharging electric vehicles has been an obstacle to their diffusion; conversely, the massive adoption of smartphones equipped with 4G has facilitated the implementation of traceability: actors + activities + geolocation; the use of certain IoTs relies on the deployment of cellular networks for connected objects such as Sigfox or LoRa).
- Human linked to mistrust : or even non-acceptance of innovations by individuals (e.g. the introduction of voice commands in warehouses was accompanied by reluctance on the part of employees; some consumers are worried about the use that will be made of the usage data from connected products and do not adopt them).
- Legal : as innovation opens up a loophole or reveals a legal vacuum (e.g. problems of liability in the use of crowd-logistics; question of the status of employees in "ubiquitous" systems; recognition of the legal value of smartcontracts associated with blockchains; authorisations for the use of drones for delivery or autonomous vehicles).
- the resistance from certain actors : (individuals or organisations) who may see the more or less 'forced' adoption of innovations as a desire to control or dominate other actors (e.g. the resistance of suppliers to the imposition of the traceone system by Carrefour; or the hostility towards the electronic bracelets patented by Amazon to track employees in warehouses) or the additional costs that they do not see as being necessary: resistance from suppliers to the imposition of the traceone system by Carrefour; or hostility towards the electronic bracelets patented by Amazon

to track employees in warehouses) or additional costs that do not seem justified to them (e.g. consolidation and collaboration centres, a logistical innovation "copied" from Walmart, were not adopted by Carrefour suppliers) [11].

### **VI. How Innovation Contributes to Competitive Advantage :**

Competitive advantage describes the ways in which a company can select and implement a common strategy to achieve and maintain a competitive advantage [29]. To gain a competitive advantage, companies must continually focus on identifying differentiated product strategies, building or redesigning core competencies, acquiring unique technologies, and accumulating intellectual property, all of which can be used to help companies thrive in a highly competitive environment , thereby creating a market [30]. Furthermore, a company's knowledge management and sharing and innovation strategies represent the importance of improving competitive advantage [31]. Innovation is considered by scholars and managers to be an important source of competitive advantage [32]. For his part, Hamel [33] identified four types of innovation, which he represented in the form of a pyramid. This pyramid classifies innovations according to their ability to create sustainable competitive advantage [34] :

*Managerial innovation*  
*Strategic innovation*  
*product innovation*  
*process innovation*

Firms tend to use a number of strategies to improve their business, such as quality improvement, reliability improvement, new product development, service improvement [35].

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Thus, many authors claim that this type of innovation in SCM is an important source of competitive advantage creation [36].

### VII. CONCLUSION

Innovation is a complex process that becomes increasingly important to companies as markets become more competitive than ever. In addition, innovation pioneers are not limited to a single conceptual vision, each interprets it from their own perspective, thereby enriching the concept of innovation. From a logistician's point of view, according to the literature review, supply chain management represents a very broad field in which innovations can be introduced to enable businesses to survive in very difficult conditions, but these innovative projects in supply chains often do not competitive advantage and may lead to becoming an ongoing threat to the company. When introducing innovations, the different risks of each innovation process must be taken into account in order to gradually integrate innovations into the supply chain.

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