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## Risk Management in Logistics Projects: Selected Risk Identification Methods

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**Abstract:**

**Purpose:** The purpose of the study was not only to present the specifics of logistics project management and risk management but also to draw attention to the relevance of the choice of risk identification method – the degree of their usefulness was presented.

**Design/Methodology/Approach:** The method used is a review of domestic and foreign literature. The subject of the research were scientific articles on project management, including logistics and risk management, published by domestic and foreign authors.

**Findings:** Every project, including logistics one, requires the involvement of appropriate resources to achieve its objectives. Project management is a complex and multi-faceted process that emphasizes the role of the manager who, by leading a team and utilizing the organization's available resources, strives to achieve the objectives set. One should also remember that each completed project is a great experience, which is gained not only by the contractor but also should be passed on to others who plan the preparation and implementation of the project. However, the type of company, its environment, and resources as well as the specifics of the project should always be taken into account in the project management process.

**Practical implications:** The systematic identification of risks, as well as the application of appropriate control mechanisms, contribute to confidently safeguarding the company against surrounding risks. The choice of a single method for identifying risks in logistics projects may not be sufficient to provide a transparent and complete picture of the risks involved in the project. However, it should be borne in mind that too many risk identification methods used may result in data scattering or loss.

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## 1. Introduction

Changes in the market of both goods and services require the entrepreneur to respond flexibly to the emerging changes, along with the skillful utilization of resources, not only their own but also those of others in a well-thought-out manner to achieve the set goals. High volatility is a specific feature of the business environment in which companies operate and carry out their unique project-related activities, including in the field of logistics.

New complex tasks called logistics projects are introduced and implemented to improve the customer service level, increase business efficiency in the area of procurement, transport, storage, production, distribution. These projects are important for the implementation of Industry 4.0 solutions. The main role of such projects is to find a practical solution whose implementation will help alleviate problems associated with the flow of materials, information, money, people or knowledge.

Logistics project management and the resulting project approach is a relatively new concept in business management as well as supply chains. The key objective of logistics projects is to deliver the right product or service within the accepted project limitations. Logistics projects can be implemented within a single company or between companies along supply chains. Among the many criteria for qualifying projects, including logistics projects, the most important are: the time and effects of their implementation, the functional scope of the project, the type of activities and results, the budget, the funding sources, the geographical coverage, the scope of the subject, the number of participants.

This paper is focused on presenting the essence of logistics project management, together with the identification of risk assessment methods.

## 2. The Essence of Logistics Project Management

In global business, more and more companies are moving towards project management or project-based management (Czajkowska, 2017; Pisz, 2011) including in the area of logistics. Meeting customer demands and satisfying their needs requires companies not only to respond quickly to change but also to keep up with new developments. Efficient and skillful project management ensures the success of the projects implemented in an organization. As a result, logistics projects are increasingly becoming singled out. Therefore, there is no doubt that there is a growing interest among both practitioners and management theorists in the subject of logistics projects and the methods of their effective management. Moreover, methods and tools, including IT tools, facilitating the course of logistics project management are popularized (Goździewska-Nowicka and Antoszak, 2011).

Kasperek (2006) defines a logistic project as a time-separated activity that aims to deliver the right good at the planned time, to the designated place and at a specified

cost. Witkowski and Rodawski (2007), state that a logistics project is a one-off, time-limited and budgeted task, the implementation of which serves to improve the efficiency and effectiveness of the flow of products and accompanying information in enterprises, supply chains, or spatial systems.

On the other hand, Kasperek and Szoltysek (2009) treat a logistics project as a project that is separated in terms of time, cost, and organization, and its implementation contributes to the optimization of the logistical process of an organization. According to Pisz (2011), a logistics project can be defined as a complex, unique and exceptional set of activities that can be described by technical and economic parameters and is defined by, cost, time, and scope to support logistics management in an enterprise/supply chain.

Therefore, the main objective of logistics projects can be considered to deliver the right product or service to simultaneously meet customer needs and provide a competitive advantage, while maintaining the accepted project limitations.

Logistics project management, on the other hand, involves planning activities, organizing, scheduling, monitoring, and directing all aspects of a logistics project (e.g., cost, time, scope) and motivating all its participants (e.g., project team, subcontractors), while applying appropriate knowledge, skills, tools, techniques, etc., to achieve or exceed the expected results of a specific logistics project.

The fundamental rationale for implementing project management in business practice is the increasing number, not only of changes and innovations but also of digitization, computerization, and the accelerating pace of their implementation in companies. This has been particularly noticeable recently in the area of logistics.

Moreover, Matwiejczuk and Pisz (2020) point out that the economic crisis caused by the COVID-19 pandemic, which has been occurring not only in Europe but also in other regions of the world since Q1 2020, has contributed to the redefinition of businesses, including the introduction of changes in logistics and supply chains.

In business practice, this means the implementation of new, unique project-related activities, in this case, logistics projects (Matwiejczuk and Pisz, 2020).

The introduction of project management into the business practice is an important factor from the point of view of the efficiency of operation of both a single link (enterprise) and entire supply chains.

### **3. Risk Management in a Logistics Project**

As the complexity of business grows, it becomes increasingly difficult for entrepreneurs to know the full extent of the problems that may arise in their operations. Therefore, risk management is becoming increasingly essential

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(Wroński, 2007) and is one of the prerequisites for business success and survival (Rytel, 2010).

When analyzing selected definitions of risk management (Gaschi-Uciecha, 2019), it can be seen that some researchers focus on the need to control, minimize or eliminate risks. Others, on the other hand, believe that risk management will enable the business to survive, to maximize the positive consequences of emerging risks. The mere awareness of the existence of risk, also in a project, provides the opportunity to take preventive action or to exploit the opportunities it presents.

Therefore, the implementation of a logistics project entails various opportunities, and also risks, which a given company or supply chain should be prepared for and able to exploit accordingly.

Łapuńska and Pisz (2014) define logistics project risk management as decision-making and implementation of actions leading to the achievement of an acceptable level of risk by the project team. The implementation of any logistics project is associated with the possibility of difficult and sometimes even impossible to predict situations, the consequences of which may cause delays in the project, an increase in its costs, or the implementation of the project in a different scope and quality than it was agreed (Łapuńska and Pisz, 2014). Logistics project risk management can also be regarded as a decision-making process that supports the achievement of the planned project objective and allows the reduction to an acceptable level or complete elimination of any risk factors that threaten its proper implementation (Pisz, Łapuńska, 2015).

The risk management process should be an integral part of project management, especially for complex logistics projects.

According to the PMBOK (A Guide to the Project Management Body of Knowledge, 2009), the risk management process of a project, in this case, also a logistics project, consists of the following steps:

- risk planning,
- risk identification,
- risk analysis (qualitative and quantitative),
- risk response planning,
- risk monitoring and control.

Risk management planning aims to determine how certain risk management activities should be carried out in a given logistics project. In the process, a so-called organizational infrastructure is set up to support the project manager during risk management.

The second stage of risk management, risk identification, involves compiling a comprehensive list of threats (risk factors) from possible events to identify risks and determine the degree of risk to the logistics project. Both internal and external events that affect the project are analyzed. Wysocki and McGary (2005) associate risk identification with the work of the entire project team. Elkington and Smallman (2002) additionally point out that the risk identification process itself can be more effective if it involves the experience and knowledge of other people, i.e., other project stakeholders or people not involved in the project. Business practice shows that a significant share of the risks in a logistics project results from the compilation and multiple interactions between the different elements of the project (Pisz and Łapuńska, 2015).

The next step in the risk management process is risk analysis (qualitative and quantitative).

Qualitative project risk analysis aims to determine the probability of a risk occurring and to identify the potential consequences of its occurrence (Karbownik and Wodarski, 2014). The basic tool for assessing the level of risk is the probability and impact assessment matrix (Prywata, 2010).

Quantitative risk analysis produces quantifiable values for the probability and consequences of a risk occurring (A Guide to the Project Management Body of Knowledge, 2009). It allows determining the feasibility of meeting project objectives, establishing reserve levels, or checking target levels, resulting from the triple constraint (time, budget, requirements) (Karbownik, 2014).

Risk response planning involves suggesting actions to minimize risks or intensify potential benefits for defined project objectives (Karbownik, 2014).

The final stage, risk monitoring and control, aims to implement a risk management plan, which should be an integral part of the logistics project plan. It is a process of continually observing the threats/opportunities identified, as well as the conditions with which they are associated. Besides, it aims to respond according to the adopted risk management plan (Karbownik, 2014) and to identify new risks/opportunities in the project, thus checking the validity of the identified risks/opportunities in the project.

It should be emphasized that the activities undertaken in project risk management should be systematic and continuous, and thus risk management should be planned and intentional. This has to do with the project environment and its surroundings, which are not only subject to change but also require ongoing project risk management activities to be undertaken throughout the project life cycle (PRINCE2, 2010).

#### 4. Selected Methods and Tools for Risk Management in a Logistics Project

Risk identification is a fundamental step that is indispensable for an effective risk management process in a project, including a logistics project. It requires not only the determination but also the application of a wide range of methods and tools that will enable the precise identification of the risks involved in the project.

Table 1 summarizes the scope of application of selected risk management methods and tools in the project and logistics project, with the division into primary and subordinate.

**Table 1.** Application of selected risk management methods and tools

Methods and tools	Risk planning	Risk identification	Qualitative risk analysis	Quantitative risk analysis	Risk response planning	Risk monitoring and control
Expert surveys	o	x	o	o	o	
Planning meetings	x	o	o		x	
Document review	o	x				o
Analogy comparisons		x	o	o	o	
Plan evaluations		x				o
Delphi method	o	x	o	o	o	
Brainstorming		x			o	
Crawford's Slip Method		x			o	
SWOT analysis	o	x			o	
Assumptions analysis		x	o	o		
Network analysis		o		x	o	
Program Evaluation and Review Technique (PERT)		o		x		
Ishikawa diagram		x				
FMEA		o	o	o		
Pareto-Lorenz chart		o				
Five Whys method		o				

**Note:** x – primary use, o – secondary use

**Source:** Own study based on Czajkowska, 2017; Gaschi, 2013; Goździewska-Nowicka and Antoszak, 2017; Pritchard, 2002.

The selection of appropriate methods needed to identify risks in logistics projects depends on available data, knowledge, experience, skills, and needs. Too many methods used may result in data being scattered or lost altogether. A summary and description of the selected methods, highlighting their strengths and weaknesses, as well as the possible outcomes resulting from their application.

**Table 2.** Summarizes the listed methods and tools that can be used to identify risks in logistics projects.

**Table 2.** Application of selected risk management methods and tools

Methods and tools	Characteristics
Expert surveys	The method consists in selecting a suitable expert in a given project area and providing him/her with specially prepared questions, in the form of a questionnaire, concerning this area. It allows accumulating knowledge about the likelihood and consequences of the manifestation of adverse events. It also collects information on how to prevent emergencies. It pre-identifies ways to respond to risk factors.
Planning meetings	They are conducted among all project stakeholders, who are familiarized with risk issues in the project. At the meetings, risk levels, risk management methods, risk monitoring, and risk reporting are agreed upon. The persons or organizational units in charge of the implementation of the risk response systems are appointed. Arrangements are made to monitor identified and potential risks. A common project risk management mechanism is established.
Document review	It consists in a detailed analysis of the documentation used to implement the project in terms of risk identification. The review is carried out with a view to avoiding the omission of important information that may allow risk factors to be identified. The documentation to be reviewed should come from the customer as well as the project implementers.
Analogy comparisons	It employs archived documentation of previously completed projects. Such documentation is used to look for processes analogous to the current project and the previously applied solutions, analyses, and results, as well as the obtained results.
Plan evaluations	Project implementation is preceded by detailed planning and development of planning documents. It defines what is to be done, how it is to be done when it is to be done, and by which party for the smooth implementation of the project, a methodical, careful, and repeated analysis of the project planning documentation is carried out. It implies checking the completeness and consistency of all materials. At the same time, it is a way to assess the accuracy and timeliness of the relevant data.
Delphi method	It draws on the knowledge of experts in the field. The opinion of all study participants is obtained (by mail) by completing the prepared questionnaire. A common, uniform expert opinion of all those being surveyed is sought.

Brainstorming	It is used to obtain information from meeting participants on a problem clearly defined by the presenter. Each participant is allowed to express their opinion, which is not judged in terms of information value. The discussion does not presume a rigid framework. This creates a high degree of openness among participants to express new opinions and provide solutions.
Crawford's Slip Method	A clearly formulated question or specific risk issue in the project is posed to the survey participants. In a ten-times repeated questioning process, participants anonymously and in writing provide answers or an opinion. Repeatedly asking the same question or problem makes it possible to successively gain new insights into the same issue
SWOT analysis	Information is collected as a result of questions such as what strengths and weaknesses exist in the organization, what opportunities the project opens up, and what risks the project poses to the organization. Conducted during the initial project planning period, it results in a description of the overall risk or feasibility of the project.
Network analysis	The analysis is based on sagittal and nodal diagram methods (also known as consequence diagram). It graphically illustrates the logical relationships between all tasks or groups of activities in the project. Risk analysis is performed by determining the probability of adverse factors negatively (or positively) affecting cost and schedule. It focuses on the relationships between all the tasks in the network diagram and the risks that may exist for those tasks.
Program Evaluation and Review Technique (PERT)	It resembles a dynamic pattern of interrelated processes. It is used to coordinate the disparate elements of a project and their respective impact on cost, time, and each other. The program evaluation and review technique provide a more adaptive overview of these dynamic elements than traditional static project charts and schedules. It is used in large and small organizations that require coordination of resources, teams, costs, and timelines to achieve dedicated results.
Ishikawa diagram	It involves identifying the problem, determining its causes, and categorizing individual causes into appropriate groups.
FMEA	It identifies relationships between causes and effects of identified hazards (defects) and optimizes activities and costs.
Pareto-Lorenz chart	it provides a graphical breakdown of the types of errors, problems, or their causes. Pareto-Lorenz analysis is based on the rule that 20–30% of causes determine 70–80% of effects.

<p>Five Whys method</p>	<p>It identifies the causes of the problem. It is conducted in two aspects. The first concerns the causes of the problem, that is, what caused the problem in the first place. The other is about the detection of the problem, that is, why our current system failed to detect the problem when it occurred. It is based on the assertion that each subsequent question is a determination of the previous question asked why. It is very helpful in assessing less complex issues and the cause-and-effect relationships within them.</p>
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*Source: Own study based on Czajkowska, 2017; Gaschi, 2013; Goździewska-Nowicka and Antoszak, 2017; Pritchard, 2002].*

The key criteria for selecting an appropriate method for identifying risks in logistical processes should be both its usefulness and also the type of information desired. Taking into account the common features, limitations and similarity of some methods of risk identification in logistics processes, it is advisable to analyze their differences, which consequently may determine the choice of the appropriate method.

Risk identification activities in logistics processes, to be effective, should be treated as a continuous process that requires the collection of relevant data and their appropriate analysis.

## 5. Conclusions

Every project, including logistics one, requires the involvement of appropriate resources to achieve its objectives. Project management is a complex and multi-faceted process that emphasizes the role of the manager who, by leading a team and utilizing the organization's available resources, strives to achieve the objectives set. One should also remember that each completed project is a great experience, which is gained not only by the contractor but also should be passed on to others who plan the preparation and implementation of the project. However, the type of company, its environment, and resources as well as the specifics of the project should always be taken into account in the project management process.

The systematic identification of risks, as well as the application of appropriate control mechanisms, contribute to confidently safeguarding the company against surrounding risks.

The choice of a single method for identifying risks in logistics projects may not be sufficient to provide a transparent and complete picture of the risks involved in the project. However, it should be borne in mind that too many risk identification methods used may result in data scattering or loss. The ability to accurately select risk identification methods in logistics projects is very difficult and requires a lot of flexibility, knowledge, and experience in decision-making.

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