

Environmental Analysis as a Part of the Context in the Risk Management Process

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Abstract – Safety and security are the most significant factors in human life. Accordingly, achieving the required level of safety and security needs steps to keep an acceptable level and fully manage and support it with appropriate activities. Securing both domains requires implementing a risk management process that will be effective and have the desired results. The whole issue is closely related to the critical context, which is the source of essential information regarding the risk management process, and which is related to the environment, processes, and stakeholders. This paper deals with determining the first part of the context analysis – environmental analysis. Techniques (PESTLE and SWOT analysis) are proposed for optimal analysis in the paper, and the analysis is subsequently carried out on the example of air transport in Slovakia. The article provides a fundamental overview of environmental analysis and is suitable for further research.

Keywords - safety, security, context, environment analysis.

1. Introduction

The concept of safety and security has been used for centuries and, in the simplest sense, represents stability, certainty and satisfaction for an individual, society and business. It is a state of absence of danger, which should be a sustainable concept and the highest achievable goal for anyone [1]. The concepts of safety and security have a lot in common, though the underlying criteria of both terms are certainly not identical or equal but complementary [2]. First of all, it should be highlighted that every system in every organization has its environment, processes and stakeholders in both domains, safety, and security. The whole concept creates the organization's context necessary to ensure safety and security, emphasizing potential risks. Hence, context analysis is necessary to comprehend the whole organization, its goals and intent, its structure and how it works and operates. This contains the reflection of the internal and external context relevant to the organization's objective and business goals, which could impact the organization and continual risk management process outcomes [3]. Specifying the context represents determining all parameters that organizations must consider when managing risk. When implementing context analysis, it is possible to proceed per ISO 31 000 or other risk management methodologies that ensure an appropriate, proactive, and practical approach [4]. Therefore, in general, it is necessary to analyze all essential connections related to the processes, the interested parties or stakeholders that create the conditions and impose various requirements on them and the environment in which the processes are implemented.

Thus, the whole context analysis contains:

- environmental analysis,
- stakeholders analysis and
- process identification and mapping.

This article will pay attention to the fundamental part of context analyses – environmental analysis.

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Environmental analysis is essential because the whole operation is in a particular environment with all the factors and aspects. Every business organization in every domain has its own external and internal environment, significantly affecting the operation, production, or provision of services [5], [6]. Plus, from the environmental point of view, the particular system can have an unpleasant impact on the environment, but the environment can also have an undesirable effect on the system. The system's ability to undesirable affects its environment is determined as safety; the power of the environment to affect the system unpleasantly is usually defined as security [7], [8]. Systems, processes, people and operations are always related to the environment, which is formed by internal and external stakeholders and has the potential to create undesirable conditions resulting in risk [9].

2. Methodology

The article focuses more closely on the environmental analysis in connection with the context analysis linked to the risk management process based on the analysis of available publications and existing theoretical background. Using the example of air transport in Slovakia, the article will point out the methods (PESTLE and SWOT analysis) that can be used in environmental analysis, emphasizing risk factors. The article is separated into two fundamental parts.

The first part focuses on qualitative analysis and collecting data and information related to risk management, context identification, environmental analysis, and methods. A general search method was used for the analysis of the publications, The Web of Sciences, Scopus and Google Scholar databases were explored by using the terms "safety", "security" and "risk management" in combination with the words "analysis" and "context identification", "environment", "environment analysis" and "aviation". Based on the available publications, relevant publications were analyzed by a simple META analysis. The obtained information and data were assessed and subsequently analyzed as partial results.

The second part of the article is devoted to the internal and external environment, aspects and factors related to the risks. This part is based on the META analysis, as many results are established from the previous research. Furthermore, PESTLE and SWOT analyses were used. The PESTLE analysis is a standard technique for performing an environmental analysis. Organizations use PESTLE to examine factors (the political, economic, social, technological, legal, and environmental) that may affect the profitability of a business [10].

A SWOT analysis is about all strengths, weaknesses, opportunities, and threats and is an essential tool to assess an organization's performance. It is a data-driven and fact-based evaluation of an organization that covers many aspects. Plus, it can estimate a competitive position and create strategic plans [11].

3. Environment analysis

An environment analysis (some publications can use the term environment scanning) allows organizations to determine internal and external factors that negatively or positively impact their business. In most cases, internal features demonstrate the company's strengths and weaknesses, while external factors show the possibilities and threats outside the organization. Based on analysis results, the organization can predict the future, identify threats, develop a mitigation strategy and response, support accomplishing business goals, create practical plans and marketing programs for a business and enhance organizational performance [8], [9].

The entire environment analysis process (Figure. 1) includes the following steps [5], [6]:

1. Environmental factors determination.

In aviation, it is vital to consider legal aspects and regulations, particularly for safety (Annex 19) and security (Annex 17) or economic factors, such as market requirements and competition.

2. Information collection

via PESTLE analysis, SWOT analysis and other supplementary methods such as Horizon Scanning.

3. Competitors' evaluation

via a technique called spying.

4. **Effects indication and forecasting** of particular environmental factors that may impact the organization.

5. **Strategies evaluation** as a final step of evaluating existing and possible strategies with projection of environmental modifications that may affect business.

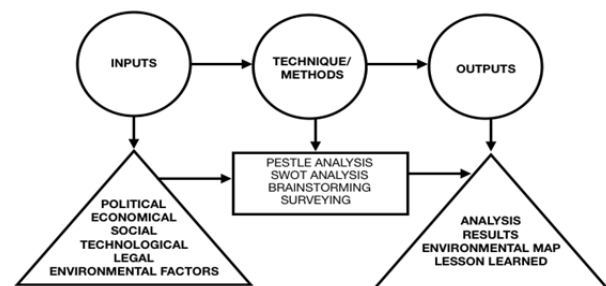


Figure 1. Analysis of the environment with an emphasis on inputs, techniques, and outputs

Aviation is a specific and complex sector with many related factors that can adversely affect the operation.

In particular, the external environment can pose threats that may negatively impact the whole operation and suspend operations entirely, the company's economy or threaten the market position of the airline. Thus, it should not be forgotten that the external environment is often influenced by the market, which develops and is sensitive to various changes, crises, and events [12]. At the same time, the operation is affected by many stakeholders, whether on the part of the state or the aviation authorities, as well as its suppliers, for instance, catering, maintenance, fuel, etc.

The internal environment in aviation represents a summary of various activities, processes, personnel, internal suppliers, and technologies, which create a complex structure full of threats and dangers, errors, and possible problems. Even though aviation tries to ensure both domains: safety and security, it is a very demanding and hard-to-achieve complex that requires correct methodological procedures [13]. In the case of the internal environment, it is necessary to consider human factor errors, even among experienced employees with many years of experience. The impacts are usually similar to threats from the external environment, as these threats can also endanger operations and cause collapse or loss of market position [14].

PESTLE analysis examines various features that relate to political factors and the political situation in a country, which may change, may be stable or, on the contrary, may be in political conflict in the country (for example, the current military conflict in Ukraine). With economic factors, it is necessary to deal with finances and sources of finances, unemployment in the country or inflation, the rate of gross domestic product (GDP) and alike. Social factors examine the level and quality of human life in a country, religious influences, or lifestyle. Technological factors are related to technologies, innovations, used technology (software) and the level of automation. Legal factors reflect restrictions, legislative requirements, implemented policies and other standards (for instance, pandemic restrictions). Finally, environmental factors examine the aviation company's environment, the country's requirements regarding environmental protection, and the weather conditions [15].

The following table (Table 1) provides a tool for processing PESTLE analysis in aviation. The tool contains questions related to each group of factors and examples to be explored.

Table 1. Typical PESTLE factors and Questions to ask during analysis with a few examples

Factors	Questions to ask	Examples
political	Who are the stakeholders?	state, ICAO, IATA, EASA. airports, insurance and leasing groups, customers, etc.,
	What is the situation in the country (base, destinations)?	stability, war conflicts, corruption, health, economic or other crises,
	How is the legislation set up in the country and how does it affect the operation?	safety/security requirements, operation requirements, property rights,
economic	Does the organisation need funding?	own sources, external funding, grants, and subsidies,
	What is the level of unemployment in the country?	unemployment rate, decline, growth, and influence,
	What is the level of inflation?	creeping, walking, galloping, and hyperinflation, acceptable or unacceptable level,
social	What are society's levels of education, health, social mobility, and safety perception?	high, medium, low,
	How lifestyle choices influence the population?	social and cultural aspects, mobility, community health, etc.,
	How do religions influence the population?	restrictions, law,
technological	How sufficiently is a technology used?	innovations, automation and level of automation, changes in infrastructure,
	What is the level of automation in the country?	
	Are there any new technologies available?	
legal	How do changes to legislation and regulation impact the organisations?	slot policies, noise limits, emission standards, etc.,
	How does the organization keep compliant?	
environmental	How much can the weather affect the operation in the selected region?	weather conditions,
	How are environmental standards set in the country?	waste disposal laws, environmental factors.

SWOT analysis examines the organization's strengths and weaknesses from the internal environment and opportunities and threats from the external environment.

The following table (Table 2) is a guide that contains some important questions that must be answered to properly ensure the results and analysis, along with examples.

Table 2. Typical SWOT factors and Questions to ask during analysis with a few examples

Factors	Questions to ask	Examples
strengths	What are the company's qualities?	strong, relatable values, positive company culture, good safety culture, job security,
	What accomplishments has the company made?	revenue generation, introduction of new protocols, reducing employee turnover,
	What helps the company to achieve its objectives?	high-level goal identification and tracking, share progress updates, good time management,
weaknesses	What makes it challenging to accomplish objectives?	employee turnover, inefficient processes, competitive market, etc.
	What is the biggest problem in the company?	uncertainty about the future, financial management, customer service, etc.
	What are the company lacking?	resources, technology, staff, etc.,
opportunities	What products, services, or information is popular with customers?	destinations, price, information, online access, etc.,
	Can the company profit from any present economic or market trends?	–
	What technology or systems will be widespread in the future?	robots, artificial intelligence (AI), machine learning, etc.,
threats	Is market health predicted to be harmful or turbulent?	–
	Do competitors have a distinct advantage over the company?	
	How does the customer or market view the company?	

4. Results

Based on PESTLE and SWOT analysis, it is logically possible to determine the following categories of threats in the environment:

- **political and legal threats,**
- **economic threats,**
- **social threats,**
- **technical threats,**
- **ecological threats.**

In the past, several pieces of research were carried out in connection with this issue, which were aimed at a thorough study of the available threat catalogues [16]. The acquired past knowledge and supplementary research will be used and processed to describe threats that can be identified to the environment of an airline or an airport operating on the territory of Slovakia.

4.1 Political and legal threats

Instability in Slovakian politics remained for longer period of time, which can bring various unexpected impacts and legislative changes. In addition, the overall stability of air traffic can also be disrupted by the ongoing pandemic, which has brought with it measures such as nationwide lockdowns, bans, or even the complete suspension of air traffic and the closure of the leading international Slovakian airports. In addition, it is necessary to mention that Slovakia is in a terrible geographical location because the whole air transport is influenced by much stronger international airports from all sides. It is also worth noting that, despite several attempts, Slovakia still does not have its national air carrier [17], [18]. Based on the thorough research on this issue and the already mentioned political problems in the country, it is possible to add that the country, for example, does not have a complete safety management system per ICAO Annex 19. Plus, there is a lack of translations of legislative requirements, which can also create a threat effect [19]. From this angle, it is possible to define several threats, which are also related, for instance, to non-compliance with legislation or prescribed measures. It can be said that it is primarily a violation of safety. Still, in case of intentional violation of legislation, the area of security would also be violated.

4.2 Economic threats .

The economic situation in Slovakia is slowly recovering from the pandemic and continuing its revival and growth. However, supply chain problems and shortages of many raw materials are still expected to continue. In addition, the country currently has a relatively low unemployment rate in Slovakia, about 7.09%. However, according to several sources, Slovaks' purchasing power is among the weakest in the European Union. The situation is worsened by the current war conflict in Ukraine and an equally strong wave of refugees, which has re-started air traffic, but it is not yet possible to say with certainty what long-term effect it will have [21]. Many economic and air transport problems can currently be attributed to pandemics. Yet, statistical data show an overall year-on-year decrease in passengers as well as goods. For comparison, in 2019, 145,794 people and 46,081 tons of goods were transported; in 2020, 38,787 people and only 18 tons of goods were transported. However, in 2015, up to 582,883 were transported, almost 75% more than in 2019. So, in general, the downward trend in air transport continues [22]. The business and economic environment of the country can therefore generate several threats.

4.3 Social threats

The population is over 5.4 million: mainly Slovaks (83,5%), Hungarians (7,7%), and the rest are other nationalities or national minorities. The moderate population density is 110 inhabitants per km². In 2020 the median age of the Slovak population was 41 years. Human Development Index (HDI) by the United Nations, which compares poverty, literacy, education, life expectancy, birth rate and other factors, is very high in Slovakia (0.860). Religious influences are primarily Christian. The standard of living in the country is relatively high, and the level of crime is also relatively low. However, violent crime is rising slightly, and the rate of unrest in the country is also increasing, which is partly related to economic threats and the uncertain situation in the country. Moreover, there is a relatively high level of racism in the country, and extremist expressions also occur here [23]. In addition, COVID-19 has developed an unprecedented level of public fear, likely impeding the tourism industry. People are afraid to travel and fly, negatively affecting air operation and transport [24]. Even though Slovakia is a relatively stable country from the point of view of social security and there are also no significant religious influences, unemployment and the related interest in travelling can cause a problem, especially in the future with rising ticket prices. In addition, the social environment can be disturbed by an ongoing pandemic, the onset of other crises (economic and energy) and, last but not least, a war conflict in a neighboring country, less than 100 km from the Kosice International Airport.

4.4 Technical threats

Technical threats are often related to the technical means used in operation, at the airport, particularly during maintenance or aircraft fueling. But it should be highlighted that almost every air operation process needs technical means. However, it is usually an intervention in the security area because such threats have the nature of intentional crimes, for instance, intentional fire, theft, or other damage. Threats of a technical nature can also include information threats related to information technologies, which are widely used in air transport. Such threats can completely disrupt the operation or even the company's running. These include various sabotages, abuse of rights, breach of integrity or theft of identity or data, phishing, pharming, computer infiltrations and the like. The current situation in Slovakia is somewhat more acceptable than in the world, given that in connection with the war conflict, there are many attacks and infiltrations into systems, especially abroad. News portals are particularly at risk, but any area can be affected.

4.5 Ecological threats

Ecological threats are primarily related to meteorological conditions in the country. The territory of Slovakia lies in a mild climate zone with a regular alternation of four seasons, a typical feature of middle latitudes.

Therefore, air transport is not affected by significant meteorological fluctuations, although due to global warming, there are hot summers, which can negatively impact, for example, take-off runways. On the other side, winter conditions can also be a problem and many aviation incidents, especially during winter, happen because of heavy snow on the ground.

However, hurricanes, earthquakes and volcanic activity are not typical in Slovakia. Other environmental threats are related to noise and emissions. According to official information from AIP SR, no noise limits are applied at Kosice Airport. On the contrary, Bratislava Airport introduces some restrictions, especially for take-offs and arrivals for airplanes not certified according to ICAO Annex 16, Volume I. Operations are allowed only in exceptional cases. In addition, other restrictions are introduced for arriving aircraft [25].

Ecological threats most often belong to the category of threats that cannot be influenced and usually have the nature of so-called threats. "Force majeure," and the category of threats that disrupt the area of safety.

SWOT analysis

A simple example of a SWOT analysis can be found in the following figure (Figure. 2), which points out some essential aspects of air transport. In addition, airlines often benefit from their market position, destinations, and the aircraft fleet or other equipment they have at their disposal. On the contrary, airports can increase their attractiveness by offering additional technical equipment and passenger-focused services. The weaknesses of both types of aviation organizations include, for example, the wrong name of the company and the obligation to comply with the selected legislation, for instance (Regulation No. 261/2004) when refunding for flight delays or cancellations. Undoubtedly, the biggest threat to air travel is the restrictions related to the pandemic and other impacts associated with the new options available to business travelers, such as video conferencing, which means that these travelers may no longer use air travel as they have until now. In this particular example, only general factors are given, which may differ from the airline or airport, its location, the results of the PESTLE analysis, etc. It is necessary to add that this analysis falls exclusively within a specific airline company's competence, which must evaluate its strengths and weaknesses, including opportunities and threats.

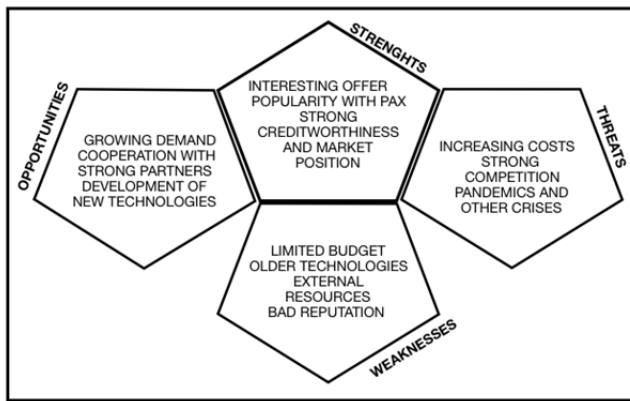


Figure 2. SWOT analysis

5. Conclusion

Security and safety are currently the highest priority in various business areas, especially aviation. An adequate way to reach the required level of both (security and safety) is by implementing a proactive risk management system within the risk management process. The proactive approach should be continuous and include individual risk management steps, which start with risk identification. Before identifying the risks, it is crucial to identify the context, including environmental analysis. This context aims to detect possible threats related to the complexity of the processes, the requirements of the interested parties, e.g., stakeholders and the conditions imposed on the operation by the external and internal environment.

This article aims to describe the importance of the internal and external environment and to define and analyze the methods by which this environment can be identified. PESTLE and SWOT analysis are valuable tools for analyzing the context because both deal with all significant factors and characteristics that can generate risk. The selected methods were implemented in the example of aviation in Slovakia. In addition, the article also presented some examples of specific threats that may be critical for the area of safety or security.

In conclusion, it is possible to determine the area of safety and security is relatively difficult to identify. Still, selected methods make it possible to categorize better and divide threats. To achieve the best environment analysis results, it is recommended to use a combination of both methods because these methods complement each other and are easier to process. In addition, the analysis can be supplemented with different techniques, such as horizon scanning, spying, brainstorming, etc. Last but not least, a proper environment analysis significantly facilitates the analysis of stakeholders directly related to the internal and external environment. Therefore, this analysis is fundamental, and every business should approach this part of the context with maximum consistency.

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