



RISK FACTORS AFFECTING RELATIONS WITH SUPPLIERS

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ABSTRACT. Background: In the recent period, one could notice that more and more international companies implementing their strategies based on the concept of risk management. These companies when they evaluate and qualify their suppliers use the requirements of quality management standards, quality assurance standards (in particular sectors), safety and security management standards for supply chain, as well as business continuity management standards. This article aims to determine the importance of the risk factors affecting relations with suppliers.

Methods: The research was carried out between October and November 2017 using the Computer Assisted Telephone Interview (CATI) technique. The study covered 300 producers from the automotive, metal and chemical sectors operating in the Polish B2B market.

Results: The surveyed enterprises indicated as the most critical sources of threats in relations with suppliers: the possibility of untimely deliveries, quality defects of products, the financial situation of suppliers, communication problems (related to the understanding of the requirements by the supplier), low level of supply flexibility, product assortment errors, limited production capacity.

Conclusions: Recapitulating the theoretical considerations and the results of empirical study, it can be stated that the role of the risk management concept in relations with suppliers is significant. Risk management is still essential to ensure the safety of purchased products as well as to ensure the continuity of processes and to avoid disruptions in supply chains.

Key words: relationships with suppliers, risk management, safety management standards in the supply chain.

INTRODUCTION

Many enterprises establishing relationships with new suppliers focus their requirements on the guidelines contained in international quality management and safety management standards [Rebelo et al. 2016]. The latest edition of these standards in its assumptions takes into account the concept of risk management. For this reason, the attention of business customers is increasingly focused on assessing the ability of suppliers to ensure the safety of products and processes in the supply chains. For these reasons, B2B companies are expecting evidence that suppliers can guarantee the technical quality of product solutions to the highest possible degree, ensure timely deliveries, and achieve the ability to reduce operating costs [Alikhan et al. 2019].

Often, B2B clients (and especially multinationals) carry out a comprehensive preliminary assessment of suppliers by analysing the data contained in the self-assessment cards provided by suppliers concerning specific requirements relating to the above-mentioned criteria. The credibility of these data is verified by audits. The assessment of the technical quality of products is of particular importance. B2b customers carry out an assessment of the technical quality of products, including through a comparative laboratory analysis of samples from potential suppliers and assessment of their compliance with the required technical specification, trial purchase, free temporary use (in relation to machines and devices), collecting opinions from current users (during the so-called reference visits). Due to the perspective of shaping long-term partnerships between

economic entities, the legal and financial situation is also important for the initial assessment of suppliers. This assessment includes the performance of obligations (financial / material / intangible assets, indebtedness, profitability, financial liquidity, shares in other enterprises, type and range of insurance and financial guarantees) that may determine the stability and sustainability of these relationships in the future.

The criteria above mentioned are not taken into account only in the initial assessment and qualification of suppliers. They are also the basis for their periodic assessment, which is largely based on past experience resulting from cooperation. Of particular importance in this respect are elements such as timeliness of deliveries as well as their flexibility, effective communication, production and technological (technical or organizational) capacity to reduce costs, shorten cycles of operational processes, improve the impact on the natural environment, improve safety conditions and ensure continuity of inflow products and information in the supply chain. Periodic qualification is often based on a comprehensive analysis of suppliers' assessment sheets, self-assessment questionnaires (containing data indicating effectiveness in achieving expected process improvement indicators), and also through audit results [Singh 2014, Govindan et al. per 2015, Torres-Ruiz, Ravindran 2018].

REQUIREMENTS FOR SUPPLIERS IN THE FIELD OF RISK MANAGEMENT

As already mentioned, a particularly important element of the suppliers' assessment is to guarantee the technical quality of the products. Ensuring the quality of the product requires strict compliance with the legal requirements relating to providing the safety (included in the European Union directives and technical standards) of the specific supervision of operational processes associated with the realization of the product (like customer service, research and development, purchasing, production, packaging, delivery to the customer) as well as the resources (employees, infrastructure and environment). An essential

role in ensuring the safety of products is the effectiveness of monitoring and measurements of operating processes and their parameters. The unified requirements for companies that are suppliers in the above issues are contained in the international organizational standard ISO 9001 [Su et al. 2015]. The latest edition of the ISO 9001 standard based on the risk management concept (described in the ISO 31000 standard) should make the suppliers more obliged to ensure the safety of products and operational processes [Oliveira et al. 2017].

Particular attention is paid to operational risk, which is connected with the possibility of incurring losses due to insufficient or faulty infrastructure, incorrect operating procedures, mistakes made by people, problems with suppliers and / or customers, and external events. Examples of operational risk include:

- delivery of defective materials or infrastructure by suppliers,
- untimely delivery of materials / infrastructure;
- shortage of employees with the required qualifications;
- failure to achieve the required process objectives (efficiency, effectiveness, timeliness, technical parameters);
- accidents, breakdowns caused by difficult working conditions or non-compliance with OSH rules, or extreme natural events, such as flood, hurricane, earthquake.

One of the most frequently used tools that enables the company to identify the risk of threats in processes and products (as well as to determine their detection and potential impacts and significance for companies as well as for clients), and to design preventive and corrective methodologies is FMEA [Dudek-Burlikowska 2011, Bhattacharya 2015, Sutrisno et al. 2015, Hrbackova 2016]

It can be observed that, in addition to the often-used FMEA (FEMCA-FMECA - Failure Mode, Effects, and Criticality Analysis), enterprises use other risk assessment tools such as check lists, Preliminary hazard analysis, Structured interview brainstorming, Delphi technique, Root Cause Analysis/ Single Loss Analysis (RCA/ SLA), Business Impact Analysis (BIA), Fault Tree Analysis (FTA), Event Tree Analysis (EFA), Cause-

Consequence Analysis (CCA), Hazard and Operability Study (HAZOP). These tools are described in the standard complementary to ISO 31000, which is IEC/ISO 31010 Risk management - Risk assessment techniques.

It should be noted that in some sectors the requirements placed on suppliers in the field of quality management is not only concern compliance with the guidelines contained in the ISO 9001 standard. They are also extended by additional requirements listed in relevant documents (specifications, standards) such as the automotive sector (ISO/TS, IATF 16949, VDA series 6), the aviation sector (AS/EN /JISQ 9100), the rail industry sector (ISO/TS 22163), the medical devices sector (ISO 13485),–petroleum, petrochemical and natural gas industries (ISO/TS 29001), the direct packaging materials sector of medicinal products (ISO 15378), the cosmetics production sector (ISO 22716), the packaging industry for food products (EN 15593) and the sector of fusion welding of metallic materials (ISO 3834).

Risk management in supply chains refers to emergencies (such as fire, explosion, chemical leakage) that can cause adverse effects on employees, infrastructure and the environment. These situations can have a significant impact on the disruption of the flow of products in the supply chains. For this reason, enterprises require their suppliers to prevent effectively and adequately emergency preparedness. Particular supervision should cover sources of potential hazards such as the use of flammable liquids, compressed gases or storage and transport processes of products.

THE ROLE OF SAFETY MANAGEMENT AND BUSINESS CONTINUITY MANAGEMENT STANDARDS IN THE SUPPLY CHAIN

Enterprises recognize the significance of risk of threats in processes implemented in the supply chain, which are the result of internal and external conditions [Papa 2013, Cedillo-Campos 2014]. The main threats to enterprises can be errors made by employees or the lack of

adequate supervision over the efficiency and security of the infrastructure. On the other hand, external threats include fires, energy failures, floods, hurricanes, transport accidents, catastrophes, sabotage, theft [of goods, means of transport, documents], terrorism, failure to meet the terms of the contract by suppliers or customers, loss of commercial credibility, or financial. It can be noticed that more and more often companies also carry out Vendor Due Diligence, which analyses and assesses the level of implementation of broadly understood security procedures of partners [Bueno-Solano 2014]. For these reasons, more and more economic entities offering logistics services are beginning to be interested in implementing the guidelines contained in international standards of supply chain security management included in the ISO series 28000 standards. The main ISO 28000 standard (which is the basis for certification) provides guidelines for the planning, implementation, and monitoring of the flow of products and services to the final customer. Application of the safety management system in the supply chain is based on the analysis and assessment of the risk of threats in individual processes carried out by partners participating in the supply chain and verification of the standardization of procedural rules ensuring continuity of their implementation, as well as emergency procedures. The effectiveness of the implementation of this system is strictly dependent on the principles of communication with the partners who are participants of the supply chain (mutual information on possible threats) and the awareness of employees involved in the implementation of processes. Supervising this system requires monitoring and measuring the effectiveness of measures to ensure security in the supply chain [Park et al. 2016]. Implementation of a system compliant with the requirements of ISO 28000 is a tool approach to risk management in processes related to purchases, production, packaging, storage and transport (maritime, car, rail) of goods, as well as supporting activities such as: transaction financing, customs agency activities, delivery IT services [Manuj and Mentzer 2008]. To limit the risk of threats, more and more enterprises focus their attention on implementing the concept of business continuity management by suppliers. Supervision of the business continuity ensures

achieving the set goals and affects the positive image, and thus the value of the organization. The requirements in this respect are set out in the ISO 22301 standard. Societal security - Business continuity management systems - Requirements. More detailed solutions regarding the implementation of the concept of continuity management are set out in the ISO 22313 standard. Societal security - Business Continuity Management Systems - Guidance [Torabi et al. 2016]. The concept is based on the identification of threats to the functioning of organizations cooperating within the supply chain and the development of Disaster Recovery Planning (DRP), which are necessary in case of incidents and crisis situations that could disrupt its proper functioning, such as floods, fires, technological failures, disasters, sabotage, terrorism, loss of commercial or financial credibility [Baba et al. 2014, Rennemo et al. 2014, Blos et al. 2015]. The ISO 22301 standard assumes that for events with unacceptable risk (e.g. failure, disaster) activities are planned and implemented, taking both the form of technical and organizational solutions (such as DPR) to ensure removal of the consequences (and their causes) on the basis of defined operational procedures (emergency procedures) and restoration of the process under normal conditions. The parameters of operations that are managed within BCM are availability (services, resources, etc.) and timeliness (performance of tasks, processes, etc.). Defining the required minimum parameters in the scope of processes allows for the selection of appropriate operating procedures and resources, which are included in Business Continuity Plans, BCP [Faertes 2015].

The implementation of the concept of business continuity management is based on Business Impact Analysis (BIA). The guidelines for its application were defined in the technical specification ISO / TS 22317 Societal security - Business continuity management systems issued in 2015 (BIA). This analysis allows to identify critical elements for the implementation of processes and specify the necessary procedures and resources to ensure the organization functioning in the event of unforeseen events / incidents / crisis situations that could disrupt

its proper operation. Effective implementation of this concept requires:

- identification of threats and determining the acceptable level of risk associated with them;
- identification of critical processes and resources (supervised infrastructure, qualified personnel, current and reserve suppliers) and their impact on maintaining the continuity of the implementation of products offered by the organization;
- determination of the assumed parameters MBCO (Minimum Business Continuity Objective), RTO (Recovery Time Objective), RPO (Recovery Point Objective), MTPD (Maximum Tolerable Period of Disruption);
- determination of emergency procedures and necessary technical measures in the event of incidents interfering with the functioning of processes;
- shaping the organizational culture by supervising the observance of procedures defining the rules of conduct in emergencies, training employees (raising employees' awareness) and
- conducting audits and reviews of the business continuity management system, assessing the effectiveness of its implementation.

The principles of cooperation between partners in supply chains are defined by ISO / TS 22318 Societal security - Guidelines for supply chain continuity. The guidelines in this document indicate that activities carried out by partners in the supply chain by focusing on ensuring business continuity should provide resilience that reflects immunity to the disruption that may arise [Torabi et al. 2015, Parkouhi et al. 2019].

ISO / TS 22318 defines the methodology of cooperation with partners who are sources of purchases within the chain. Its first stage is to subject mapping the supply chain and to conduct a business impact analysis of the risk of each partner.

The most important group are strategic suppliers whose replacement is associated with a high level of risk, as they often provide goods with unique technology that are difficult to substitute. Another group is core suppliers

that ensure products and services that are important for the chain's operation. The last group, however, are transactional suppliers, also referred to as non-critical or routine, offering material products or widely available services. For each of the separate groups of suppliers, the goals defining Recovery Time Objectives (RTOs) are defined. The critical element of this methodology is the adoption of a specific strategy for building relationships and ensuring the continuity of the chain. In the case of critical suppliers, this cooperation should aim at building strong relationships based on mutual trust, defining common goals determined of improving performance and efficiency (and in particular reducing the time of reaction to disruptions).

THE METHODOLOGY OF RESEARCH AND RESULTS

The subject of the empirical study conducted identification of threat sources in relations with suppliers and determination of methods for assessing these threats. The research was carried out between October and

November 2017 using the Computer Assisted Telephone Interview (CATI) technique. The study covered 300 producers from the automotive, metal and chemical sectors operating in the Polish B2B market. The study was commissioned to a specialized research agency that conducted a targeted selection of companies registered in the database, which is a search platform of a business directory. The surveyed enterprises indicated as the most critical sources of threats in relations with suppliers: the possibility of untimely deliveries and quality defects of products. These threats were particularly indicated by large enterprises (employing over 250 employees) operating in the automotive and chemical sectors.

The results of the research show that the product quality worms are very important for enterprises with foreign capital. Significant sources of threats covered the financial situation of suppliers, communication problems (related to the understanding of the requirements by the supplier), low level of supply flexibility, product assortment errors, limited production capacity. Detailed results of the research are presented in the tables 1 and 2.

Table 1. The importance of risks in relationship with suppliers (general results and a comparison between the segments depending on the capital, ranking using the Likert scale, correlations)

Risks in relationships with suppliers	General N=300	Capital	
		Polish N=120	Foreign N=180
Timely deliveries	3.536667	3.558333	3.522222
Quality defects of products	3.316667	3.150000	3.427778
The financial situation of suppliers	3.120000	3.025000	3.183333
Communication problems	3.100000	2.966667	3.188889
Flexibility of supply	3.070000	3.000000	3.116667
Assortment errors in deliveries	2.993333	3.008333	2.983333
The limited production capacity of suppliers	2.953333	2.833333	3.033333
Technological problems	2.866667	2.750000	2.944444
No emergency delivery plans	2.830000	2.708333	2.911111

Source: results of the empirical study

Table 2. The importance of risks in relationship with suppliers (comparison between the segments depending on the number of employees, ranking using the Likert scale, correlations)

Risks in relationship with suppliers	Number of employees	
	-250 N=223	251- N=77
Timely deliveries	3.511211	3.610390
Quality defects of products	3.300448	3.363636
The financial situation of suppliers	3.112108	3.142857
Communication problems	3.089686	3.129870
Flexibility of supply	3.058296	3.103896
Assortment errors in deliveries	2.995516	2.987013
The limited production capacity of suppliers	2.950673	2.961039
Technological problems	2.834081	2.961039
No emergency delivery plans	2.766816	3.012987

Source: results of the empirical study

Table 3. The importance of risks in relationship with suppliers (comparison between the segments depending on the sector, ranking using the Likert scale, correlations)

Risks in relationship with suppliers	Sectors		
	Automotive N=99	Metal N=104	Chemical N=97
Timely deliveries	3.606061	3.423077	3.587629
Quality defects of products	3.454545	3.240385	3.257732
The financial situation of suppliers	3.313131	3.201923	2.835052
Communication problems	3.414141	2.951923	2.938144
Flexibility of supply	3.282828	2.971154	2.958763
Assortment errors in deliveries	3.080808	3.096154	2.793814
The limited production capacity of suppliers	3.030303	2.875000	2.958763
Technological problems	3.050505	2.855769	2.690722
No emergency delivery plans	2.838384	2.894231	2.752577

Source: results of the empirical study, 2017

Table 4. The importance of activities related to the evaluation of the supplier before buying (general results and a comparison between the segments depending on capital, ranking using the Likert scale, correlations)

Form of assessment	General N=300	Capital	
		Polish N=120	Foreign N=180
Testing the product batch	4.006667	4.125000	3.927778
Product certificates	3.436667	3.491667	3.400000
Audit of supplier	3.240000	3.133333	3.311111
System certificates	3.173333	3.341667	3.061111
Assessment of the supplier using the evaluation questionnaire	3.153333	3.050000	3.222222
Due diligence	3.143333	3.058333	3.200000
Reference visits	2.886667	2.758333	2.972222

Source: results of the empirical study

Table 5. The importance of activities related to the evaluation of the supplier before buying (comparison between the segments depending on the number of employees, ranking using the Likert scale, correlations)

Form of assessment	Number of employees	
	-250 N=223	251- N=77
Testing the product batch	3.955157	4.155844
Product certificates	3.390135	3.571429
Audit of supplier	3.219731	3.298701
System certificates	3.147982	3.246753
Assessment of the supplier using the evaluation questionnaire	3.134529	3.207792
Due diligence	3.112108	3.233766
Reference visits	2.852018	2.987013

Source: results of the empirical study

Table 6. The importance of activities related to the evaluation of the supplier before buying (comparison between the segments depending on the sector, ranking using the Likert scale, correlations)

Form of assessment	Sectors		
	Automotive N=99	Metal N=104	Chemical N=97
Testing the product batch	3.898990	3.942308	4.185567
Product certificates	3.393939	3.269231	3.659794
Audit of supplier	3.404040	3.192308	3.123711
System certificates	3.343434	2.971154	3.216495
Assessment of the supplier using the evaluation questionnaire	3.282828	3.067308	3.113402
Due diligence	3.333333	2.971154	3.134021
Reference visits	2.989899	2.932692	2.731959

Source: results of the empirical study

The surveyed enterprises indicated that the essential pre-purchase forms of assessment of threats related to suppliers included: testing the trial batch and possessed product certificates. These forms of assessment are particularly

important for large companies (employing over 250 employees with Polish capital, mainly from the chemical sector.) As other essential forms of risk assessment related to suppliers, the surveyed business entities indicated:

supplier audit, system certificates, initial and periodic supplier evaluation using the evaluation questionnaire as well as due diligence. Detailed results of the research are presented in the tables below:

The supplier's audit is of particular importance to large enterprises with foreign capital from the automotive sector. In turn, system certificates are essential for large business entities with Polish capital from the automotive and chemical sectors. The initial and periodic evaluation of the supplier using the evaluation questionnaire as well as due diligence are focused on large companies with foreign capital from the automotive sector.

CONCLUSIONS

Recapitulating the theoretical considerations and the results of empirical study, it can be stated that the role of the risk management concept in relations with suppliers will still be significant. Risk management is still essential to ensure the safety of purchased products as well as to ensure the continuity of processes to avoid disruptions. It can also be observed that for many companies, relationships with suppliers are not limited to setting strict requirements for them and monitoring their compliance on a continuous basis. Increasingly, business customers operating on the B2B market offer their suppliers' support programs. These programs are concentrated in joint projects regarding the implementation of both product innovations (improvement of current technical parameters and implementation of new products), as well as organizational ones that contribute to improving efficiency (increasing the level of timeliness, delivery defects). These programs also focus on the efficiency of processes (reducing costs by increasing employee / infrastructure performance, or eliminating unnecessary activities and unused / underused resources). It can be noticed that the international expansion of many companies, especially global companies, increases the importance of technical standardization. This is particularly important in countries where investments are located due to lower labour costs like Central and Eastern Europe and Asia. In these countries, one could perceive

a gap in the field of organizational solutions between international corporations and indigenous businesses. In many cases, this gap is outweighed by the introduction of the concept of risk management. International companies implementing this concept focus on the cooperation with their partners in the supply chain (suppliers and customers), offering them support through joint projects. These initiatives are aimed at improving common processes and developing concepts for new products. Cooperation between business clients and their suppliers undoubtedly contributes to forming long-term mutually beneficial relationships between partners. Early supplier development in R & D processes can effectively eliminate potential errors associated with new product and mitigate the risk of not guarantees of safety for users and the environment. The effects of this cooperation allow an increase in the technological and organizational capabilities of partners, which affects their competitive advantage.

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CZynniki Związane z Ryzykiem Wpływające na Relacje z Dostawcami

STRESZCZENIE. Wstęp: W ostatnim okresie coraz więcej przedsiębiorstw międzynarodowych wdraża strategię opartą na koncepcji zarządzania ryzykiem. Przedsiębiorstwa te, gdy oceniają i te kwalifikują swoich dostawców wykorzystują wymagania standardów zarządzania jakością, standardów zapewnienia jakości (w poszczególnych sektorach), standardów bezpieczeństwa, a także standardów zarządzania ciągłością działania. Celem artykułu jest określenie znaczenia czynników związanych z ryzykiem w relacjach z dostawcami.

Metody: Badania zostały przeprowadzone pomiędzy październikiem a listopadem 2017 z wykorzystaniem techniki wywiadu telefonicznego wspomaganego komputerowo (CATI). Badania objęły przedsiębiorstwa z sektorów motoryzacyjnego, metalowe i chemicznego, prowadzące działalność na polskim rynku B2B.

Wyniki: Badane przedsiębiorstwa jako główne źródła zagrożeń w relacjach z dostawcami wskazały: nieterminowość dostaw, wady jakościowe produktów, sytuację finansową dostawców, problemy komunikacyjne z dostawcami, niski poziom elastyczności dostaw, pomyłki asortymentowe w dostawach, a także ograniczone zdolności produkcyjne dostawców

Wnioski: Rekapitułując rozważania teoretyczne oraz wyniki badań empirycznych można stwierdzić, iż rola koncepcji zarządzania ryzykiem w relacjach z dostawcami jest niewątpliwie istotna. Zarządzanie ryzykiem odgrywa ciągle ważną rolę zarówno w zapewnieniu bezpieczeństwa kupowanych produktów, jak i zapewnienia ciągłości procesów i unikaniu zakłóceń w funkcjonowaniu łańcuchów dostaw.

Słowa kluczowe: stosunki z dostawcami, zarządzanie ryzykiem, standardy zarządzania bezpieczeństwem w łańcuchu dostaw

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