

**REDUCING THE RISKS OF PRODUCTION COMPANY REGARDING THE
AVAILABILITY OF RAW MATERIALS IN THE SUPPLY WAREHOUSE
OGRANICZENIE ZAGROŻEŃ W FIRMIE PRODUKCYJNEJ DOTYCZĄCYCH
DOSTĘPNOŚCI SUROWCÓW W MAGAZYNIE ZAOPATRZENIOWYM**

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SUMMARY

The article takes into account changes in the organization of the process of planning and ordering materials through to improve internal and external communication on the example of the production company. In the case of procurement optimization key role is assigned to deepen the analysis and evaluation of suppliers, and - changing purchasing strategies. The scientific aim of the article is the proposal and characteristics of optimization activities that promote the reduction and prediction of risks and threats in the stock of raw materials in one of the analyzed production companies.

STRESZCZENIE

W artykule omówiono zmiany organizacji procesu planowania i zamawiania surowców za sprawą udoskonalenia komunikacji wewnętrznej i zewnętrznej na przykładzie przedsiębiorstwa produkcyjnego. W przypadku optymalizacji zakupów kluczową rolę przypisano pogłębieniu analizy i oceny dostawców, a także - zmianie strategii zakupów. Celem naukowym artykułu jest propozycja i charakterystyka działań optymalizacyjnych, które sprzyjają redukowaniu i przewidywaniu zagrożeń w magazynie surowców w jednym z analizowanych firm produkcyjnych.

Key words: raw-material security, map of safety, risk, threats

Słowa kluczowe: bezpieczeństwo surowcowe, mapa bezpieczeństwa, ryzyko, zagrożenia

INTRODUCTION

Scientific publications emphasizes that the risks and threats have always been present in the processes, inventory management, but in the last decade there / was reflected with particular force by several factors, especially affecting the dangers facing the warehouse management production companies. These include, but not limited to: fast-changing demand, shorter product lifecycles, reduced core product components, reduced vendor bases, reduced

buffering (eg. in inventory or lead times), more integrated and interwoven processes between enterprises, JIT, technological change, cost pressures, need for slimming and agility, increased use of outsourcing and offshoring, dependence on suppliers, etc. (Zsidisin i Ritchie 2009; Blackhurst i in. 2005; Waters 2007; Jüttner 2005; Supply Chain Vulnerability. Final Report 2002; Peck 2010; Christopher i in. 2003; Kersten i Blecker 2006).

The literature discusses general issues relating to enterprise risk management rarely takes the risk of logistics (including those which occur in the storage management) as a separate category, although it often is - directly or indirectly - one of the most serious risk category. K. Sadgrove (2005) mentions the risk of logistics distribution together with a group of operational risk. J. Bizon-Górecka (2007) attributes logistic risk to economic and technical risks. The risk in terms of logistics warehouse management also writes E. Kulińska (2011). The importance of logistic risk categories is even more evident if we look at the supply chain perspective as a benchmark.

From the analysis of several dozen case studies of the occurrence of critical situations in an enterprise, the most frequently occurring categories of risk are those that relate to broadly understood logistic structures. This risk profile, which can lead to a critical situation, can be talked about in terms of two risk categories (referring to some extent to the category of business uncertainty sources [DeLoach, 2000]): external and internal. The Group of External Risks is primarily the force majeure: natural disasters, terrorist acts, the risk of changes in operating conditions resulting from political instability, legal instability, etc. This type of risk is not a result of decisions taken in the management of the supply chain. To the risk to the internal warehouse management one can include the risks associated with lean practices - for example: outsourcing, single sourcing, JIT, risks relating to the relationship between suppliers in the transport and storage chains, for instance - the risks specific to the operation of the warehouse, such as: no one owner, bullwhip effect, chaos, inertia, risk associated with the flow of information. This is the risk the source of which lies in the decisions taken in the storage business of an individual enterprise.

There are many risk and threats categories in the scientific literature. Given the importance of risk to the storage economy, it is worth pointing to K. Sadgrove's (2005) approach to analyzing supply issues, such as reducing supplier base, supplying abroad, or JIT. He writes about the relationship between risk and quality and availability issues, as well as potential conflicts of interest and corruption. On the other hand, RB Handfield and K. McWormack, (2008, p. 51-62) focus on the different types of risks and threats that affect different management areas, including: strategies, operations, deliveries, customer

relationships, asset impairment, competition, reputation, regulatory and regulatory requirements. Whereas S.M. Wagner and C. Bode (2008, p. 307-325) share the sources of risk for demand side and supply side as well as legal, bureaucratic, infrastructural and catastrophic sources.

The activities of production companies depends on the supply of essential raw materials, materials and services, and thus of a properly organized their supply chain. Threat to its proper functioning become interference delivery process. In the analyzed production company are actions aimed at anticipating and reducing risks that may be a source of inventory management. They implemented actions to ensure the optimization of inventory management. The main goal is to significantly reduce the potential risk in the warehouse of raw materials. In the first optimization measures require development of maps of security, because it allows to define the steps that must take audited company and its suppliers. The next step is to review the process of optimizing the process of purchasing management.

1. MAP OF RAW-MATERIAL SECURITY

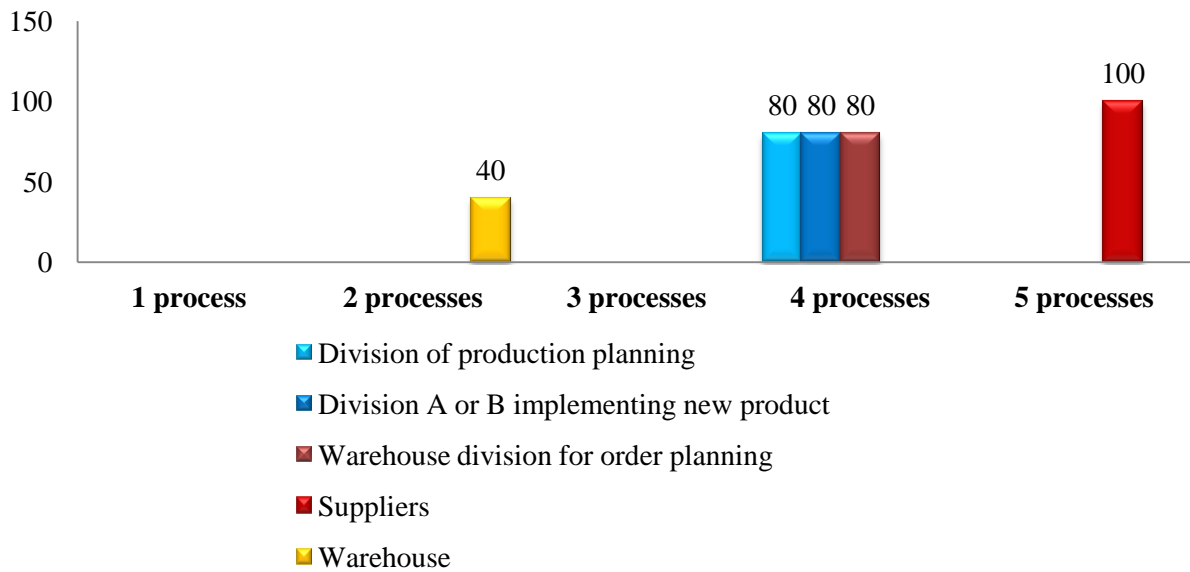
Adoption of the analysis, which will allow for the development of software to optimize inventory management, requires the preparation of maps raw-material security for the analyzed company, including those of its two production divisions A and B. Accordingly, the group of factors have been analyzed, the operation of which determines both the current safety raw-material obtained by the manufacturing company tested (Table 1) and up to the level of security (Table 2). Both of these phenomena have been characterized, taking into account the processes occurring in the tested production company. In the first case the groups that have an impact on the safety of raw-material obtained by examined manufacturing company, included (except for its suppliers of raw materials), as selected organizational units, including: department of production management, divisions A and B which design and implement new products, section of the magazine dedicated to the planning and order management, as well as other warehouse employees who perform tasks such as receiving raw materials, materials and their proper storage (Table 1, chart 1).

Table 1. Security Group of raw-material in the analyzed production company.

Process	Type of security	A group having an impact on raw-material safety in the examined company				
		Division for production planning	Division A or B Implementing a new product	Department store for orders planning	Suppliers	Warehouse

Planning for a new product	1. proper planning of a new product; 2. understanding of the needs and expectations of customers; 3. recognize market opportunities designed to meet the needs of a new production line; 4. appropriate level of internal communication department of planning a new product with other company divisions; 5. appropriate level of external communication department of planning a new product from the company partners.	X	X	X	X	
Management of the production process	6. proper planning of production; 8. flexibility in the manufacturing process; 9. good relations with contractors; balance of production; 10. The flexibility of the transformation products; 11. The flexibility of production lines; 12. The appropriate level of internal communication with other company divisions; 13. The appropriate level of external communication with partners of the company.	X	X	X	X	X
Ordering raw material and product	14. keeping lead times; 15. maintain or increase the number of orders; 16. integration between the processes of production, distribution, transport; 17. the observance of agreements by carriers, operators, etc.; 18. compliance by the suppliers of quality standards; timely deliveries; 19. lack of hidden defects in materials; 20. not having unnecessary inventories; 21. The low volatility materials; 22. no change in supply conditions.	X	X	X	X	
Supply	23. adequate supplies of raw materials in terms of quantity, quality, time, location and cost; 24. Adequate supply of goods in terms of quantity, quality, time, location and cost.	X	X	X	X	
Storage	25. The proper storage of raw materials; 26. continuous monitoring of the level of raw materials.				X	X

Source: Own study based on enterprise data.



Picture 1. Influence of the safety raw-material in the test production company

Source: Own study based on enterprise data.

On this basis, it can be concluded that the latter group of employees in the audited company has the least impact on the level of safety of raw-material companies, because their actions may only affect the process of production management and process storage (40%, that is two to five indicated steps). The course and efficiency of manufacturing process management, planning new product, ordering raw material and product, as well as supply affects the activity of such groups as the division responsible for the management of the production process, divisions A and B and the warehouse division involved in the planning and order management (80 %, i.e., four out of five steps as indicated), as well as the suppliers. These last are also responsible for warehouse processes that are taking place in their bodies and determine the quality of raw materials (100%, that is, five out of five indicated stages).

The analysis allows to conclude that the vast majority of listed groups (except for employees responsible for the warehouse processes) determines the current level of safety of raw-material obtained by examined manufacturing company. Very great importance are - besides suppliers - internal divisions of the company - mostly managing production and creating new products, because their decisions determine the effectiveness of the actions to be taken by employees consisting of contract and adapt supply to current production needs (Sitko, 2015). Therefore, this enterprise - to optimize inventory management - must implement measures that will strengthen its cooperation with key suppliers. However, the company does not gain the correct, optimum safety level, if does not improve communication and Management of production processes (such as the current and the new range of products).

Analysis included as well the level of safety of raw-material, which is associated with the selected processes in the test production company. These include: planning a new product, production process management, ordering raw material and product, supply and storage (Table 2). In the first case, none of the factors did not provide a high level of security raw-material. The average level of safety has been achieved in the context of planning a new product due to such phenomena as exploring the needs and expectations of customers (2) and identify market opportunities that address the needs for new products (3).

Table 2. The level of security of raw-material and the processes occurring in the tested production company.

Process	Type of security	Security level of raw-material in the examined company		
		Low	Medium	High
Planning for a new product	1. proper planning of a new product; 2. understanding of the needs and expectations of customers; 3. identify market opportunities to meet with the production of a new line of products; 4. appropriate level of internal communication department of planning a new product with other company departments; 5. appropriate level of external communication department of planning a new product from the company partners;	1, 4, 5	3	
Management of the production process	6. proper planning of production; flexibility in manufacturing process; 7. good relations with contractors; 8. The balance of the production; 9. The elasticity of transformation products; flexibility of production lines; 10. appropriate level of internal communication with other departments of the company; 11. The appropriate level of external communication with partners of the company;	8, 10	6, 8, 9, 11	7
Ordering raw material and product	12. keeping lead times; 13. maintain or increase the number of orders; 14. integration between the processes of production, distribution, transport; 15. the observance of agreements by carriers, operators, etc .; 16. compliance by the suppliers of quality and delivery on time; 17. lack of hidden defects in materials; 18. not having unnecessary inventories; 19. The low volatility materials; 20. No change delivery terms;	12, 13, 19, 20	14, 15, 16, 17	18
Supply	21. adequate supplies of raw materials in terms of quantity and quality; 22. Adequate supply of goods in terms of time, space and cost;		21	22
Storage	23. The proper storage of raw materials; 24. continuous monitoring of the level of raw materials;			23, 24

Source: Own study based on enterprise data.

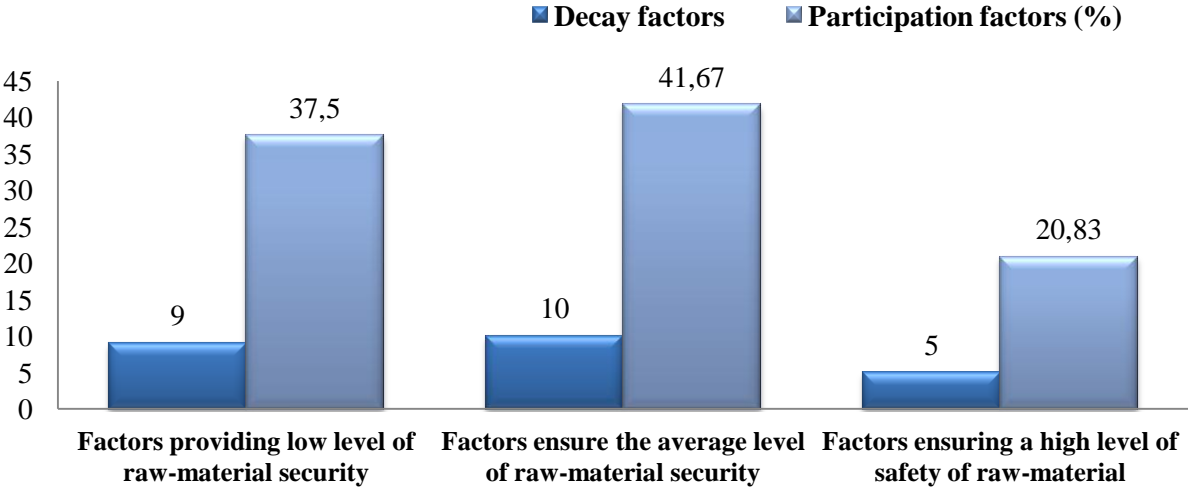
Low level of security of raw-material tested from within the planning of the new product is conditioned by such phenomena as: proper planning of a new product (1), the appropriate level of internal communication department of planning a new product with other cells of (4) and the appropriate level of external communication department planning a new product from the company partners, including suppliers (5).

In the case of manufacturing process management high level of raw-material security in the analyzed company ensure good relations with contractors (7). The average level of safety was achieved through proper planning of production and flexibility of the production process (6), the flexibility of the transformation the offered products (9), as well as by the

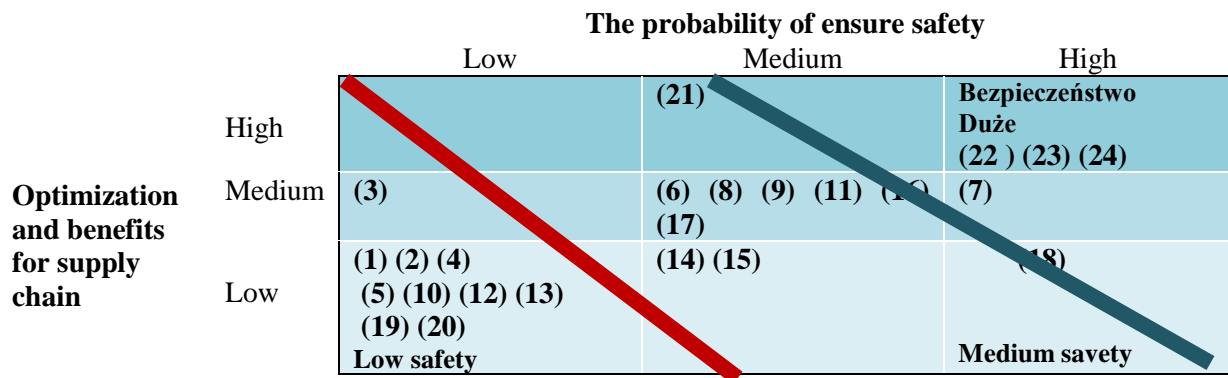
appropriate level of external business partners, including suppliers (11). Low level of security raw-material in the tested company in the management of the production process is conditioned by such phenomena as the balance of production (8) and the appropriate level of internal communication with other departments of the company (10).

In the case of ordering raw materials and a high level of raw-material safety in the analyzed company assured the lack of ownership unnecessary inventories (18). The average level of safety has been achieved through the integration between the processes of production, distribution and transport (14), adherence to the terms of contracts by carriers and operators, etc. (15), compliance with standards of quality and timely delivery by suppliers (16), as well as by the lack of hidden defects of raw materials (17). Low security raw-material tested from within the ordering of raw materials and goods was the result of the impact of such factors as: keeping lead times (12), to maintain or increase the number of orders (13), low price volatility materials (19) and no change contract terms (20).

In the case of supply of high security raw-material in the analyzed company has been ensured by adequate delivery goods in terms of quality and quantity, (21). The average level of safety has been achieved by means of appropriate supply of raw materials in terms of time, location and cost (22). In the case of warehouse processes high level of raw-material security in the enterprise has been provided by appropriate conditions for storage of raw materials (23), and carrying out continuous monitoring of the level of raw materials in stock (24).



Picture 2. Number and influence factors to ensure the safety of raw-material in section A and section B of the examined company
 Source: Own study based on enterprise data.



Picture 3. Map of the safety raw-material in the examined manufacturing company
Source: Own study based on enterprise data.

The analysis of raw-material safety in the examined company that focuses on the said security raw-material in section A and B allows lead to the conclusion that the 24 identified factors that guarantee the safety of this process - only 5 of them assigned a high impact on the appearance of risk in the supply chain (20.83% of all the factors), 10 factors - the average level of security (41.67% of all the factors), and the remaining 9 factors - low level of raw-material security (37.5% of all the factors). The analysis of factors that determines the effect of the current level of raw-material security obtained by the examined manufacturing company (Table 1 and 2) has allowed to develop a map of raw-material security. It required the application of the specific sources of raw-material security for system X and Y. Coordinate of X is the probability value and coordinate Y - level of optimization and related benefits (Diagram 1). The resulting map raw-material security in the studied company can identify a group of security with varying probability of occurrence. They bring different intensity of supply chain optimization and various benefits. They also need different strategies. The aim is to increase the safety of raw-material, take actions which increase the level, as well as its optimization and development. This last action is a conscious consolidation and improvement of afforded safety.

Analysis the maps of raw-material security in the tested production company leads to the conclusion that the company does secured basically only a medium level of security of this type. However, its level may be reduced due to numerous factors. Only a few phenomena are able to prevent or ensure the growth of this security. Action is needed to optimize that its scope will cover activity within the examined entity of production and its relationship with the environment - mainly from suppliers.

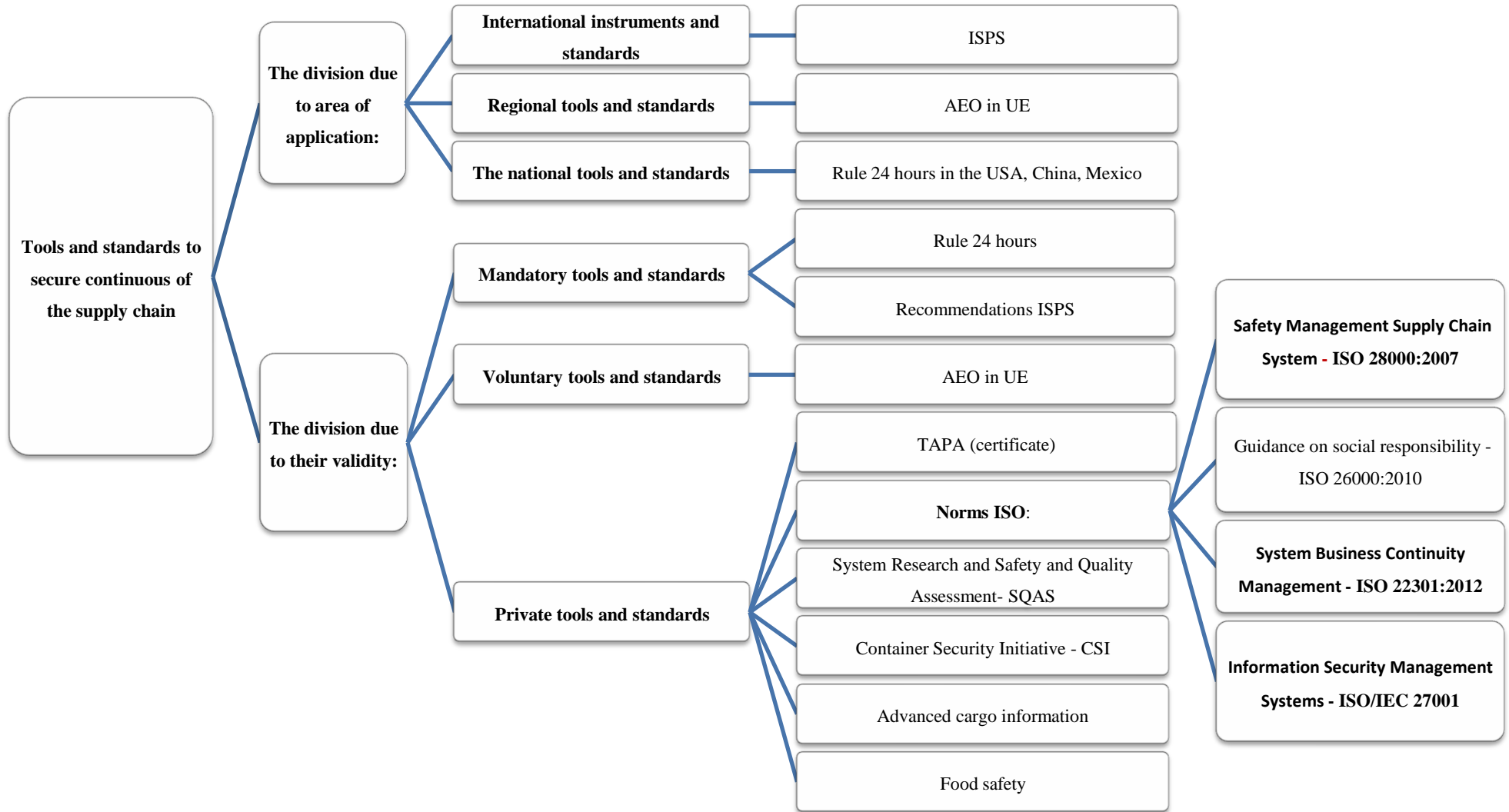
2. STANDARDS AND TOOLS THAT ALLOW SECURE THE CONTINUITY OF THE SUPPLY CHAIN

The study production company and its suppliers in order to increase supply chain security should implement the relevant standards and tools that allow secure the continuity of the supply chain (Huczek 2015, Jeżdżewska-Guta, 2016). These are indicated in the diagram 1. The audited company to ensure business continuity in the supply chain can use ISO 22301: 2012 - System Business Continuity Management (SBCM) and its related ISO 28000: 2007 - Safety Management Supply Chain System (SMSCS) and ISO / IEC 27001 - Information Security Management Systems (ISMS).

The ISO 28000: 2007 is one of the initiatives of international and private. It focuses on supply chain security (Jeżdżewska-Gutta, 2016). They were designed for companies and organizations that are involved in the supply chain. Its purpose is to enable identification of threats and reduce risk in the supply chain through the implementation of processes that should ensure safety (Jarysz-Kamińska, 2011). Achieving it requires the company to formulate a security policy and risk assessment, plan for the management, reduce the identified risks, implement the plan, security management, monitoring and surveillance system, to take corrective action when required. The organization must conduct a review of management to achieve the continuity of improvement and development in this field (Szymonik, 2014).

SBCM provides company optimum continuity management changes, the supplement should be SMSCS and ISMS. The first of these systems will enable the examinee a manufacturing company to optimize internal and external communication, so that should achieve an increase in the level of safety material and raw materials (optimize inventory management) (Jarysz-Kamińska, 2012).

For the analyzed company, it is important that SMSCS range includes the total supply chain, ie all participants who create the physical network of manufacturers and service providers. They shall cooperate with each other for the processing and transfer of goods from the raw material stage to the level of the end user. SMSCS includes all aspects that are related to issues such as product development, purchasing, production, physical distribution, after-sales services, deliveries by external providers (suppliers) (Szymonik, 2014). Examined the company should establish business goals that relate to security of supply.



Picture 4. The main tools and standards ensuring the safety of the continuity of the supply chain
 Source: Own study based on (Huczek, 2015, Jażdżewska-Gutta, 2016).

Table 3. Benefits of implementing the proposed ISO standards by the analyzed manufacturing company and its suppliers.

Benefits		Benefits for:					
Type of benefit	Benefit	Studied manufacturing company			Suppliers of manufacturing company		
		ISO 22301	ISO 28000:2007	ISO/IEC 27001	ISO 22301	ISO 28000:2007	ISO/IEC 27001
I. Continuity of the organization	Ensuring continuous operation	X	X	X	X	X	X
	Integrated organizational flexibility	X	X		X	X	
	Optimization of the organization	X	X	X	X	X	X
	Constant monitoring, analysis and evaluation of the functioning of the company	X	X	X	X	X	X
	Increase in customer satisfaction	X	X	X	X	X	X
	Improving the image and reputation of the company	X	X	X	X	X	X
	The increase in strength of the company's brand	X		X	X	X	X
	increase competitiveness	X		X	X	X	X
	The increase in the company's revenues	X			X	X	X
Reducing the cost of insurance activity	X	X	X	X	X	X	
II. Increase the safety of the company	Minimizing the risk of interference	X	X	X	X	X	X
	Procedural solutions	X	X	X			
	Detailing the responsibilities	X	X	X	X	X	X
	Development and implementation of safety programs	X	X	X	X	X	X
III. The increase in information security	Business continuity of IT systems	X	X	X	X	X	X
	Flow and data security		X	X	X	X	X
IV. Delivery	Increased security of raw-material	X	X	X			
	Increased supply chain performance	X	X	X	X	X	X
	Reducing storage costs	X	X	X	X	X	X
V. Optimize communication	The ability to improve the performance of the company through optimization of internal communication	X	X	X	X	X	X
	The ability to improve the performance of the company through optimization of external communication	X	X	X	X	X	X

Source: Own study.

For examined company a source of danger is interference in the punctuality of deliveries, which can cause disruption of the production process in section A and B. SBCM, mainly SMSCS and ISMS, it is crucial to identify threats and to estimate the risk of the delivery process. Effective implementation of ISMS enables an indication of actions that are necessary for better protection of information assets and enhance communication security organization with partners and customers. This allows the company to adjust the level of information security (IS) to the needs of your organization and expectations of customers and / or suppliers.

The key suppliers of the examined production company should implement SMSCS or SBCM or ISMS to effectively collaborate with this entity, as well as to be more competitive with other customers. Some customers require suppliers to certify ownership of these tools to optimize supply chain management, as AEO, C-TPAT, ISPS and TAPA, as well as the standards of ISO, among them it is crucial to the implementation of ISMS.

3. PROJECTED BENEFITS OF CHANGES IMPLEMENTING

Implementation SBCM and SMSCS should ensure the audited company to achieve and maintain a collision flow property from the warehouse of raw materials to the department A and B and the accompanying information (Table 3). These activities should enable both warehouse staff in the analyzed company and its suppliers to respond quickly to emerging problems and interference, which would help them to make changes that allow to meet the needs and expectations of customers (Jarysz-Kamińska, 2011). This standard provides the company, its suppliers an opportunity to engage in continuous operation and to minimize the impact of unplanned events and related disturbance. This standard is a factor that improves the image of the company, which it has implemented. Customers, shareholders and investors for the manufacturer and its suppliers will better assess these organizations, because it will increase their credibility, the reputation of these businesses and their brands (Szyszal, Gajzik, Piotrowski, 2011).

Implementation SBCM and SMSCS can also bring numerous other advantages, among which are: improving the culture of the organization and its effectiveness (play in the event of a crisis), the decline in premiums of insurance against interruptions in production, increase competitiveness, decrease in costs related to the difficulties occurring in business activity, boost business, increase revenue, reduce costs associated with the processes of storage and distribution, etc. SBCM and SMSCS test will allow the company to manufacturing to ensure a consistent approach to all the entities that operate in the supply chain. It will constitute a reference point for security management in the supply chain.

ISO / IEC 27001 will provide the company and its suppliers a list of control objectives and security covered by the ISMS, which determine the level of BI. This standard allows managers and management companies manage the necessary measures where diagnosed maximum risk. The organization can get the benefits that besides the increase effectiveness and safety of the company, will include: the fulfillment of legal conditions, lower costs (associated with emergency repairs, hearings, etc.), Improving the protection of information assets, increase awareness of BI among employees of the organization and its partners, reducing the time spent on analysis of safety violations, increase the flexibility of changing the consulting company, providing a competitive advantage, maintain trade secrets, strengthen the image of the organization and more motivated employees (Dzwonkowski, 2017). The proposed actions to optimize the examinee the company and its suppliers can provide them numerous benefits that improve their functioning and organizational activity in the market.

4. ADJUSTING THE PROCUREMENT OF RAW MATERIALS TO THE PRODUCTION PLAN BUSINESS

Analyzed company must develop a more effective schedule of internal communication, which affects the process of ordering materials and raw materials for their circulation. In this process must take part division: sales, marketing, production, division A and B, warehouse etc., as well as steel partners - suppliers and service companies in the outsourcing of transport services.

The purpose of the development and implementation of procedures in the study company's work should be focused on: ensuring the required level of customer service in the field of five major production procedures; ensure proper organization of the production process to achieve the quality required by the customer due to act in accordance with folded procedures and proper organization of the company. Key procedures implemented in the company should focus on: the processing of orders, the supply of raw materials, product manufacturing, manufacture of new products, distribution and complaints. All of these are related to system-level renewal of raw materials.

It is crucial the communication process at the stage of order processing, that there was a proper development and implementation of procedures for submitting orders for needed raw materials. Input data include: inquiry, production capacity, sales conditions, order and transport system. Inquiries sent by regular customers and new should be stored in a database. After receiving their departments calculation and technology they need to examine the possibility of production at the completion of the contract. At this stage, it is essential to communicate the magazine with the cell responsible for ordering raw materials, and with other employees of storage who have

knowledge of the level of the goods being at disposal of company. This action will check the stock and availability of the necessary raw materials and components.

After receiving an order from the customer, the order must reach to the technological department, which activates circulation card of the specific-order and putting it into the production monitoring system. Description of operation of the procedures also include: an assessment of the state of stocks, feasibility assessment order, the transport details. After receiving the inquiry relevant departments must deal with them in ways technical and production. In the absence of a specific quantity of raw material stock levels should take place generating orders to the warehouse. The key significance plays a feasibility order. Achieving this state requires communication between organizational units of the company, because, with the updated inventory, the trader contacts the employee store for establishing the date of delivery of ordered materials and components.

After the approval of all details of the order, enter them into the system, it must be remembered to check the inventory of raw materials and components. An important function must perform the transfer of an order for the production planning department. You should check whether all the necessary messages have been posted on the order system. After all the previous processes, monitoring program must inform about the status of your actions (eg. delivery specification: number of pallets, weight, size of the contract). After receiving delivery by the magazine - it is necessary to send out information about the availability of the necessary raw materials needed to carry out the order.

A similar process of communication should be implemented in the case of the introduction of new products. Due to the use of new solutions - should take into account the lack of data on previously unused materials and raw materials. Organizational magazine responsible for ordering these goods must have enough time to be able to recognize the market and suppliers offer. Only on this basis, it can choose optimal solutions tailored to the technical requirements and quality of the new product to satisfied the needs and expectations of customers, and at the same time remain competitive.

5. SUMMARY – PROJECTED BENEFITS OF IMPLEMENTING CHANGES

The analysis of the enterprise allowed identification of logistical risk factors, focusing on irregularities concerning organizational, communication and management failures, resulting in disruptions in supply relationships in the field of raw materials warehouse. Implemented changes in planning purchases in connection with the process of communication within the company and with the process of production planning should increase the effectiveness, the organizational culture of

the analyzed company. In this last case, it may record an increase in equity of organizational, human and intellectual areas. In short, the expected benefits are as follows:

1. Increase of organizational culture by: development of organizational and intellectual capital of the company, improvement of internal communication of the company, optimization of incentive system.
2. Increase operational efficiency by: reducing interference, increase in production capacity.

These benefits can be expressed in the growth of organizational, intellectual and human capital. In addition, the changes made to the planning and purchasing process should be a source of strength in the position of the audited entity among suppliers, which may have economic, qualitative, image and market advantages.

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