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SELECTION OF APPROACHES TO LOGISTIC RISK ESTIMATE BY SUBJECTS OF PHARMACEUTICAL INDUSTRY

Subjects of pharmaceutical industry usually function in the conditions of uncertainty and dynamic environment. Pharmaceutical industry is characterized by logistics risks with specific properties of drugs, active pharmaceutical ingredients and active substances.

Logistic risk in the pharmaceutical industry is an event that results in losses of SPI or makes the possibility of an adverse situation or irrelevant results which related to traffic flows within the pharmaceutical logistic chain when changing external and internal factors.

The availability of a large number of logistic risks makes it necessary to reduce risk of SPI logistic activity, and, consequently, to develop risk management mechanism. The algorithm of logistic risk management of SPI includes seven steps. In the first stage the analysis of SPI logistic operations is conducted, in the second stage there are analyzed their logistic risks and causes, on the basis of which is formed sampling data that characterize logistic activity results of SPI. In the third stage, there is quantitative and quality estimation of the logistic risks which were identified in the previous step. At the fourth level there is the analysis of internal and external factors and their on a logistic risk. Based on the previous analysis the scenarios of development of situation are developed in relation to the threat of origin of certain logistic risk and the methods of estimation of logistic risks are elected. The sixth stage is estimated logistic risk. Based on the previous analysis the necessity of calculation of integral logistic risk is reasonable.

Keywords: *logistic risk, logistics, subjects of pharmaceutical industry, logistic risks management, minimization of logistic risks.*

Introduction. Subjects of pharmaceutical industry (SPI) usually function in the conditions of uncertainty and dynamic environment. The important principle of their activity is high reliability, providing stability, flexibility and adaptation to changing operating conditions.

Analysis of the latest research. Unlike other economic sectors pharmaceutical industry is characterized by logistics risks with specific properties of drugs, active pharmaceutical ingredients (APIs) and active substances (for example, terms and conditions of storage and transportation, high probability of deterioration, processing and storage of goods, etc). Thus, according to the WHO about 25% of medical immunobiological preparations (MIP) are

delivered to the consumer in the form of spoiled kind as a result of failure to observe of temperature condition in the process of their storage and transporting [2]. The research purpose is substation of logistic risk significance that influence on quality of drugs, and development mechanisms of their minimization.

The research results were based on the use of methods of expert estimation, techniques ascent from general to specific, intercommunication of quality and quantitative descriptions. Experts were various specialists from different profiles and enterprises of pharmaceutical industry.

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Results and their discussion. The survey results defined that the share of logistics risks include a significant percent of the total value risk of SPI (15%) (Fig. 1).

Research of different scientific views allowed to define that logistical risk in the pharmaceutical industry is an event that results in losses of SPI or makes the possibility of an adverse situation or irrelevant results which related to traffic flows within the pharmaceutical logistic chain when changing external and internal factors [1, p. 280; 3, p. 364; 4, p. 10; 5, p. 172; 6, p. 12; 7, p. 15]. Sources of logistics risks in the pharmaceutical industry are carriers, suppliers of substances, storage of drugs, intermediaries and pharmaceutical manufacturers (Fig. 2).

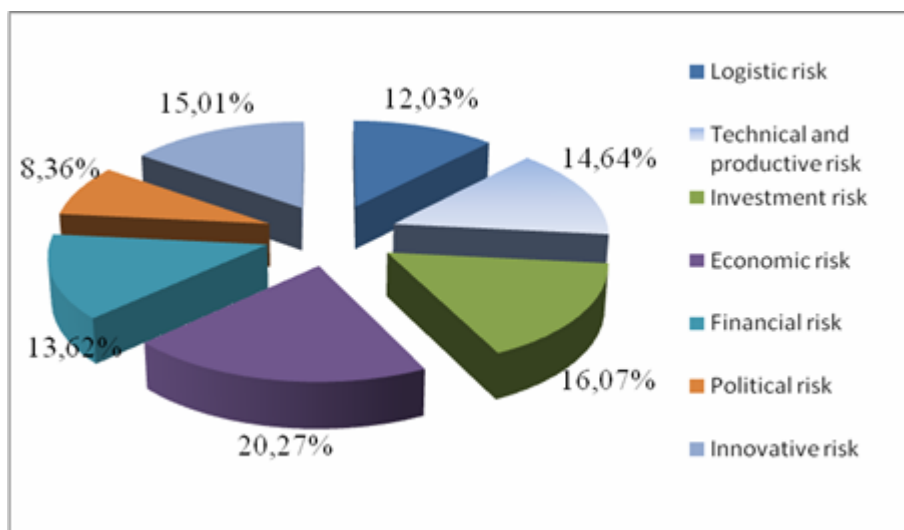


Fig. 1. Assessment of SPI risk weighting

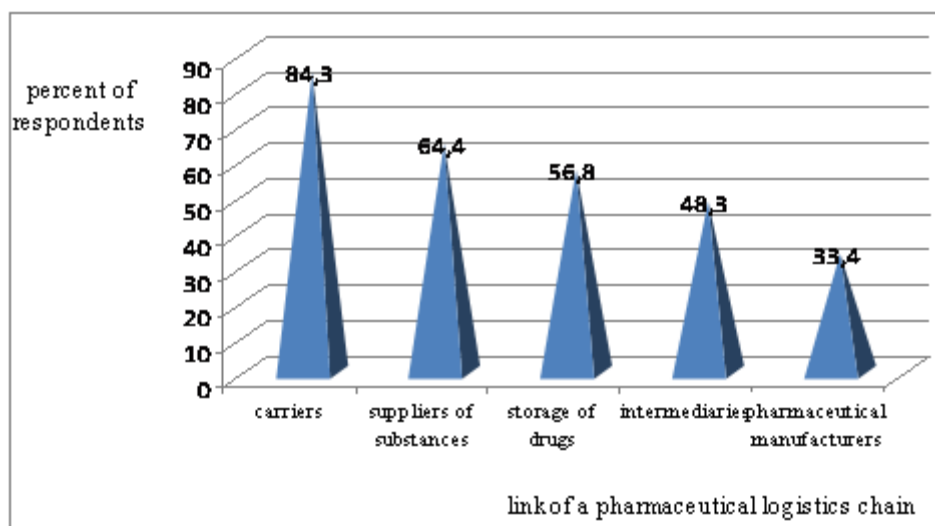


Fig. 2. The main sources of risk in the pharmaceutical logistics chain

According to the results of expert assessment of the validity of logistics risk in management of flow processes on pharmaceutical enterprises, the most significant risks are risks which arise on the stage of transportation and warehousing (Fig. 3). It is related to probability of spoilage of material resources and loss their quality descriptions and, consequently, of profit of SPI.

Considerable part of logistic risk determines that 91.5% of respondents consider logistic risks the important questions for pharmaceutical industry.

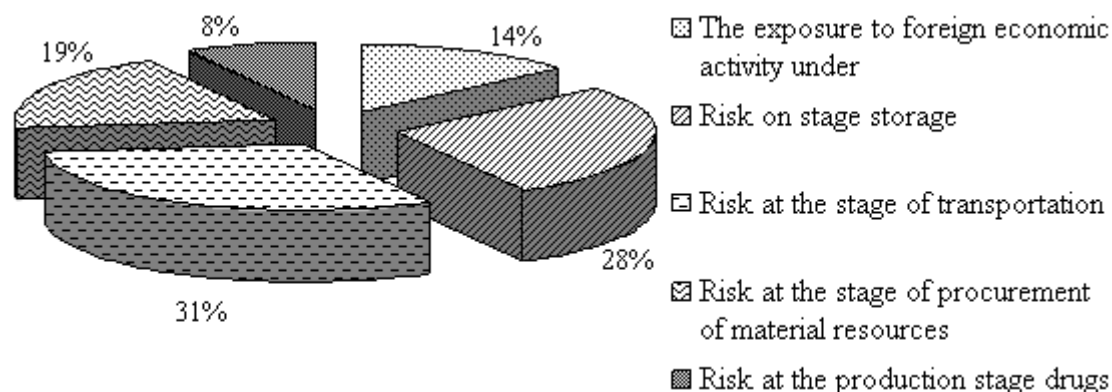


Fig. 3. Assessment of SPI risk weighting in management of material pharmacy

89% of respondents identify a significant influence of the logistic risks in the performance on efficiency of SPI and approximately 85% of respondents – the need for implementation of logistic risk system for SPI activity.

The availability of a large number of logistic risks makes it necessary to reduce risk of SPI logistic activity, and, consequently, to develop risk management mechanism [7, p. 18; 8, p. 15; 9, p. 449; 10, p. 51; 11, p. 195; 12, p. 278; 13]. The algorithm of logistic risk management of SPI is shown in Fig. 4. In the first stage the analysis of SPI logistic operations is conducted, in the second stage there are analyzed their logistic risks and causes, on the basis of which is formed sampling data that characterize logistic activity results of SPI. In the third stage, there is quantitative and quality estimation of the logistic risks which were identified in the previous step.

At the fourth level there is the analysis of internal and external factors and their on a logistic risk. The scenarios of development of situation are developed in relation to the threat of origin of certain logistic risk and the methods of estimation of logistic risks are elected. The sixth stage is estimated logistic risk. Based on the previous analysis the necessity of calculation of integral logistic risk is reasonable. The structure of an integrated logistic risk index include risk of material management; risk management of financial flows; risk information management; transportation risks; environmental risks. Complex indexes for each type of risk should be calculated using taxonomic analysis. Calculation results of the logistic risk components for the pharmaceutical company A (for confidentiality) are given in Table 1.

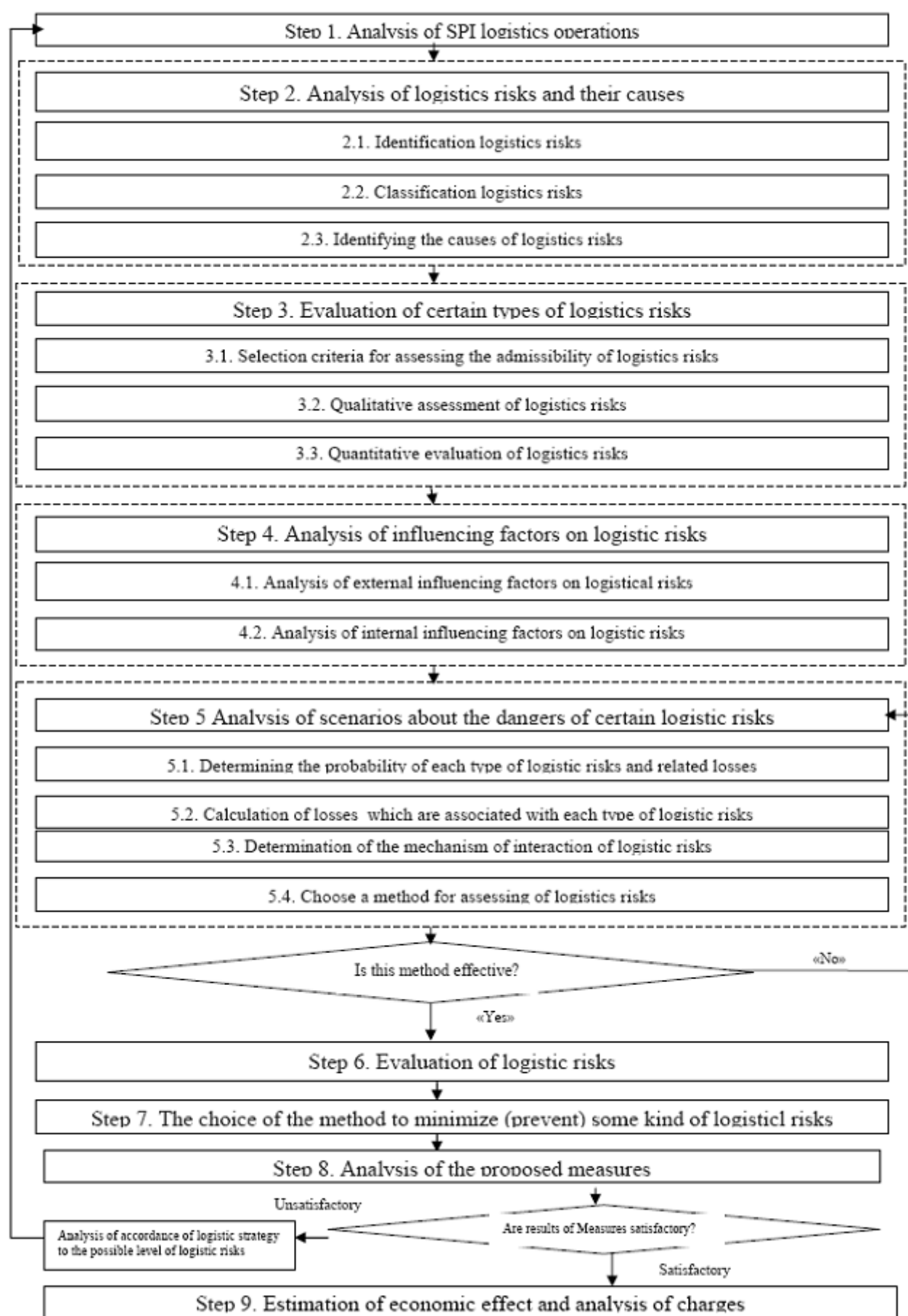


Fig. 4 Algorithm of SPI logistic risks

Table 1.

The calculation results of complex logistic risk

Logistic risk	Value		
	2011 p.	2012 p.	2013 p.
Risks management of material streams	0,69619	0,71390	0,75009
Risk of logistic administration	0,45096	0,49618	0,53469
Risk management of financial flows	0,25167	0,29571	0,60383
Risk management of information	0,44300	0,75200	0,80700
Complex logistic risk	0,46045	0,56445	0,6739

On the seventh stage measures are developed on minimization or prevention of logistic risk, and then the economic effect is estimated of the introduction of drug management system and SPI logistic costs are analyzed which associated with the implementation of this system. The complex security measures of specific pharmaceutical industry are given in Table 2.

Table 2.
Directions of minimization of logistic risks in pharmaceutical industry

Type of logistic risks	Prevention measures
1	2
Risk of wrong select logistic strategy of SPI	Revision of logistic strategy, detailed market analysis
Risk of unbalanced allocation of SPI resources	Verification of optimality of management stream processes, identification and analysis of its defects; purchase of material resources for the future use; control the delivery of resources and observance of norms of their charges; analysis of accounting, correlation with plan and base levels
Risk of inconsistency of co-operation between SPI subdivisions in relation to handling resources	Analysis of reasons of disorder of co-operations, control of managers at all levels of the work of subdivisions; exposure and liquidation of reasons of conflict situations and creation of favorable climate in the team; use motivation in the process of management; effective co-operations of SPI subdivisions in the process of logistic risk management
Risk of material resource management	Limitation Reservations Preventive control of resources Insurance of logistic risks
Risk of insufficient control at all stages of management stream processes	Supervision of SPI work from the purchase of raw material and materials to the distribution of drugs; quality analysis of regulatory documentation, statistical and book-keeping accounting
Risk of accident	Insurance of property of SPI in an insurance company
Risk of informative streams management	Collection and analysis of information; creation of informative providing system; study of normative documents and laws Protection of commercial secret
Risk of unsatisfactory implementation of conditions of the agreement	Careful selection of logistic partner; collection of necessary information about a firm-competitor; entering in the agreement the system of penalties for each commitment; indication in the agreement of terms for consideration of contradictory conditions of payment of penalties and mortgage payments
Risk of procurement and distribution of drugs	Stowage of protocol that includes terms of changes in the agreement, size of compensation in case of failure from signing of contract
Risk of rupture of relations with logistics partners	Analysis of breaking the bonds; careful choice of the logistics partner; integration of participants of logistic pharmaceutical chain
Risk of logistic administration	Logistic personnel training Selection of professional staff of logistic personnel Creation of pharmaceutical logistic information system Creation of optimal organizational structure of SPI

Conclusions.

- 1 The actuality of SPI logistic risk management is investigated.
- 2 The definition of SPI logistic risk is offered.
- 3 The sources of risk in the pharmaceutical logistic chain are investigated, SPI risk and the significance of material management risks in pharmacy are estimated.
- 4 The algorithm of SPI logistic risks is offered.

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