

# THE APPLICATION OF DECISION-MAKING THEORY TO INCREASE THE EFFECTIVENESS OF PORT LOGISTICS SYSTEMS

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## Abstract

Globalization processes in world economy determine the necessity to ascertain and effectively to take competitive advantages of port logistics systems on international level. In accordance with the purpose of port logistics systems to solve management problems of optimal movements of various flows (informational, material and financial), it is necessary to manage not only physical movements of flows or suitable selection of its technological guidelines, but also it is very important to ensure a smooth decision-making process for the selection of flows movements alternatives, to increase its effectiveness in a view of the effectiveness of port logistics systems. The authors of the article analyse the opportunities to apply the decision-making theory for the increase of port logistics systems effectiveness. Through the study of decision-making process stages the importance and the necessity of the application of decision-making theory were ground in a context of the increase of port logistics systems effectiveness. The authors determined main factors, which impact the effectiveness of port logistics systems activity through decision-making theory. In this instance, main factors of the effectiveness of port logistics systems activity could be embodied through the suitable distribution of human and other related resources, its mobility and effective use, the competency of participants of port logistics systems activity, opportunities to decrease the negative impact of subjectivity and other risk factors, also variety of decisions alternatives, flexibility of decision-making process, etc. The evaluation of this complex of impact factors ensures the increase of the effectiveness of port logistics systems through the implementation of decision-making theory.

*Keywords:* decision-making theory, logistics, port logistics systems, decision-making process, the effectiveness of logistics systems activity.

*JEL Classification:* A10, F12, L91, R41.

## Introduction

Globalization processes in world economy determine the necessity to ascertain and effectively to take competitive advantages of port logistics systems on international level. In accordance with the purpose of port logistics systems to solve management problems of optimal movements of various flows (informational, material and financial), it is necessary to manage not only physical movements of flows or suitable selection of its technological guidelines, but also it is very important to ensure a smooth decision-making process for the selection of flows movements alternatives, to increase its effectiveness in a view of the effectiveness of port logistics systems.

**The object of the study** is port's logistics systems.

**The aim of the study** is to analyse the application of decision-making theory in a view of the effectiveness of port logistics systems.

**The tasks of the study are:**

To analyse the essence of decision-making process and to exclude its stages;

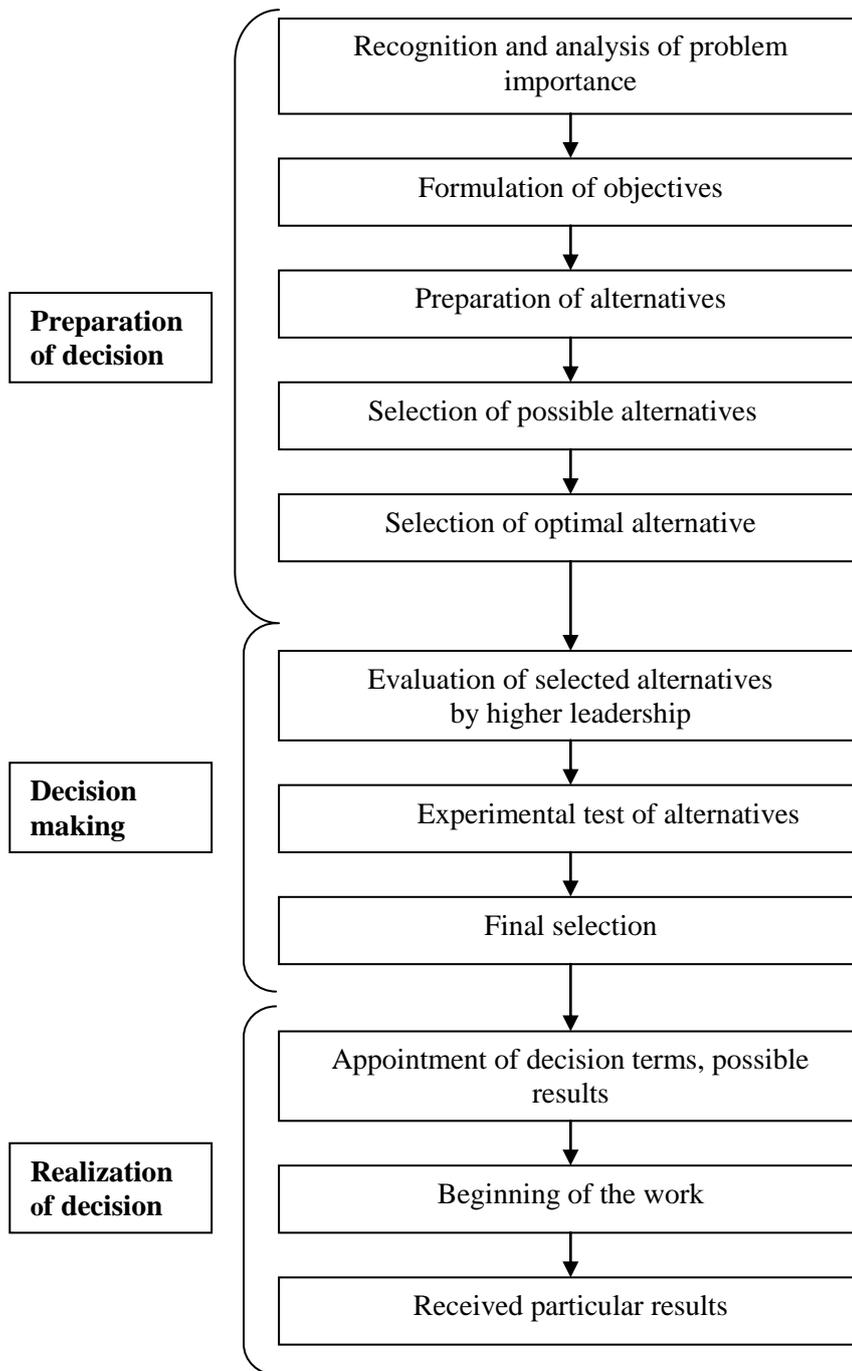
To study the particularity of port logistics systems activity;

To determine main factors, which impact the effectiveness of port logistics systems in accordance with the particularity of port logistics systems activity and opportunities of the application of decision-making theory.

**The methods of the study** are systematic, logical and comparative analysis of scientific literature, synthesis.

## The essence of the decision-making process and its stages

The scientists in economics approach the "decision-making" concept differently. It can be understood as a process, as a specific choice (selection) action and as a result of selection process implementation (Larsen, Mayrhofer, 2006; Simon, 1976; Smith, 1988). The content of "decision-making" concept is very susceptible. Therefore, it should be divided into "decision-making process in proper sense" and "management of decision-making process in broad sense" (Navickas, 2008).



**Figure 1.** Stages of decision-making process (Navickas, 2008)

Management of decision-making process in proper sense is a selection of a certain action alternative in order to achieve a particular aim. It is a result of manager's (leader's) activity.

Management decision-making process in broad sense is a long and complicated process, were, at the beginning, the decision is prepared (the importance of the problem must be assessed and the objective must be formulated). Later the methods (alternatives) of the object achievement are created and the optimal alternative is selected (management decision in proper sense is in process). In the final stage of decision realization begins the implementation of the alternative – complicated and creative process which is conducted by any rank manager (leader). Management decision-making process in broad sense includes separate stages, impacted by various factors, also by the human factor. It has direct impact on decision-making process, its flexibility.

Management decision-making process is thoroughly analyzed in economics literature by Buchanan, 1991; Drucker, 1999; Larsen, 2006; Marthinsen, 2007; Pettinger, 2001; Simon, 1976; Smith, 1988; Stoner and

*al.*, 1999. On the ground of their theories it is possible to accentuate and to distinguish the stages of decision-making process and the domination of different complexes of impact factors on separate stages. Therefore, it is purposeful to separate the decision-making process in stages for the aim to determine the levels of the importance and the impact of various factors on different stages of decision-making process (see figure 1).

Considering the stages of decision-making process, it is necessary to note, that on stages of preparation decision and decision-making the competence of decision-maker and the impact of subjectivity factor, related with its authority, are particularly important (Navickas, 2008). Also the decision-making is related with the distribution of resources, the level of the impact of external environment on decisions and on the competence of decision-maker, the complexity and the flexibility of alternatives selection and decision-making processes.

Thus, it is necessary to accentuate first two stages (preparation of decision and decision-making) of decision-making process, because the success of third stage (realization of decision) – realization of decision physically – its quality and the effectiveness of the decision-making process at all are mostly dependant on them.

### **The peculiarities of port logistics systems activity**

The scientists distinguish logistics as an integrated science with the purpose to solve management problems of optimal movements of various flows (informational, material and financial) and resources (Gourdin, 2001; Harrison, Hoek, 2005; Lambert *and al.*, 1999). The purpose of logistics systems is to service the flows, which form and move in various production and service spheres, on different coverage and development levels (Николашин *and al.*, 2003). In this instance, the flows of port logistics systems are distributed inside these logistics systems and the other proceedings have place, including the added value creation (Navickas, Sujeta, 2011). So, port logistics systems ensure the suitable problems solving of transportation, storage and port logistics service, the price system control, the increase of the competitiveness of port activity and the increase of consumption intensity of port logistics services.

It is necessary to accentuate, that the importance of human and other resources in ports activities in an aspects of production, service and consumption is increasing. So, these resources become sources of value-added creation (Navickas, Sujeta, 2011). This situation grounds and shows that the aims of port logistics systems and production and other sectors are harmonized and coordinated, i.e. the necessity to change resources in a view of time, place, quantity and quality, which ensure the development of ports and its logistics systems using logistics principles and concepts.

The role of effective application of competitive advantages in port logistics systems activity is growing on national and international levels in a dimension of global economy, because of the impossibility to survive for the business in conditions of protectionism, the well-groomed taste of consumer by high quality and standards of products and services.

Trade barriers have been decreased, but the logistics services requirements as well as cost constantly raises, so various businesses, especially on international level, change attitude to material storage, production and product distribution (Rimiene, Grundey, 2007). In this case, scientists agree, that port is the predominant contributor to facilitate international trade (Huang, Teng, Huang, Kou, 2003). Also, international competition in macro level might be explained by the advantages of national economy. As rates of globalization proceed to grow and competition becomes more intensive, it is crucial for every country to find ways to maintain and increase its ability to compete (Snieska, 2008). Thus, through the effective activity of port logistics systems and country's logistics systems at all could be increased a competitiveness of a country.

The scientists often compare the definition of port logistics with refined transport concept and could be described as "location, movement and optimal storage process of resources and other tangibles, including its source of nature, participation in various economic activities and final its consumption" (Alderton, 1995). The authors of the article take a view, that in port logistics systems it is necessary to integrate fully all internal processes into port logistics systems or into the model of economic activity flows. Thus, it is possible to achieve the aim of total optimization of logistic process in a view of port activity.

The aim to create favourable conditions for port activity grounds the necessity to improve the logistics infrastructure in port logistics systems. This infrastructure, in accordance with scientists' opinion, must be understood as a "material-technical system to provide the production and citizens' social life" (Hocob, 2007). In this instance, the logistics system is a subject, providing the production and consumption sectors with needful infrastructure and organizing the movement and distribution of various flows (material, financial, informational, etc.) through port logistics systems. At the same time, the development of port logistics infrastructure must be on a basis of these flows (Paulauskas, Paulauskas, 2003). Also, logistics infrastructure

might be described as a part of infrastructure sector defined by subsectors, i.e. by a set of physical variables (transportation infrastructure, water supply and disposal infrastructure, telecommunications infrastructure and power infrastructure) (Snieska, Simkunaite, 2009). It shows the dependence on and the importance of logistics infrastructure in economic and social life of a country.

It should be noted that the infrastructure consists of the network of various types of transport and its nodes, informational channels and systems, means of communication and locomotion, storage facilities, external provision of energy resources, financial supply systems for logistic processes, service companies for citizens, etc. (Johnson *and al.*, 1999; Hocob, 2007). The balance of infrastructure inside the systems is very important, that all transport means on concrete direction or point would be equal (Paulauskas, Paulauskas, 2003). Thus, the scientists accentuate the multiplicity and the multimodality of port logistics systems.

The authors distinguish the necessity to improve and harmonize the infrastructure for the sustainable development of port, production and consumption markets, to create conditions for effective capital expenditures. Furthermore, the destabilization of infrastructure processes determines the increase of production and logistics and other services costs, and the decline of citizens' living quality in these regions. It has negative impact on the competitiveness level of a country and consumption intensity in it.

The purpose of port logistics systems development is the determination and the appliance of economic growth disproportion and unimproved opportunities for foundation of the port development strategy. In this case the main aim of this strategy must be the achievement of long-term competitiveness of port activity through the logistics systems flexibility in a view of global economy. It is necessary to mention that these aims and processes have a positive influence on environment plight and its balance, which directly impacts port activity and logistics sector.

Investment into port logistics infrastructure allows for the increase of the logistics capacity, its effectiveness and reliability, service quality and the multiplication of added value. It causes lower logistics costs; shorter transit times of flows movement inside logistics systems and creates conditions for business expansion (Navickas, Sujeta, 2011; Waters, 2003). Moreover, changes of ownership forms in economic systems cause new opportunities for investment and capital movement in port logistics systems in a view of transformation processes in global economy (Sujeta, Navickas, 2010). In this instance the investment into port logistics infrastructure process ensures the productivity of port logistics systems, ports competitiveness and finally the growth of country's economy.

### **The increase of the effectiveness of port logistics systems through the decision-making theory**

The particularity of port logistics systems activity requires the synchronization of its elements' actions, which are necessary in material and other values endowment for production, service and trade processes (Bowersox., Closs, 1996; Johnson *and al.*, 1999). In this view it is possible to determine constant interconnection of port logistics systems elements (subjects): transportation, information, procedures, etc. So, direct participants of port logistics systems and representatives of production and consumption markets could be attributed to port logistics systems subjects. This interconnection forwards the effective use of transport network and its nodes, the increase of intensity of resources and other tangibles flows.

By the application of decision-making theory the processes of decision management are followed up on all interconnection, function and operation levels in an aspect of port logistics systems. In accordance of the necessity and the inevitability of the port development process it is very important to distinguish the differentiation of functions and operations inside the port logistics system in accordance with a purpose and distribution of flows, forms and actions harmonization of different elements of this system (Branch, 1998; Waters, 2003). In this instance the distribution of functions and operations positively impact the competence of decision-makers as one of most important factors, influencing the effectiveness of port logistics systems. It comes through the decreasing time and other costs in decision-making process in a view of port logistics services.

Moreover, the expedience expediency of operations and flows directions is directly dependent on aims and objectives of production and consumption markets. Scientists determine the necessity to assign a lot of attention to environmental changes and to achieve objectives in accordance with environmental conditions during strategic management and decision-making processes (Pikty, 2005). So, the factor of external environment must be distinguished in an aspect of decision-making process in port logistics systems activity. Also, the fact of differentiation and the constancy of elements interconnections positively impact indexes of effective use of port activity resources, expressed by technical, financial and other indicators (Navickas, Sujeta, 2011). In a view of geographic, demographic and other economic factors port logistics systems could

change the concentration of tangibles flows, its places of deployment (static), directions and path of its movements (dynamic) on national and international levels. It is achievable through suitable distribution of human resources, the effective use of its competence during the alternatives selection and decision-making processes in accordance with external environment.

By the way, the growth country's economy is ensured by the development process of port logistics systems in a dimension of resources usage and investment processes. Systemic viewpoint to the management of a system can be considered as an advantage in the aspect that it lets warrant maximum synergy of system's elements, oriented on general purposes of this system (Karpavicius, Cvilikas, Gatautis, 2007). As the activity of port logistics systems is ground by creation of synergy effect and its use, this effect could be generated and suitably distributed by the effective human and other resources use during the decision-making process. Thus, aims and the purpose of port logistics systems are related and directly influence the effectiveness of resources use in port activity, the nature of tangibles flows inside the port logistics systems in an aspect of decision-making process.

As the essence of decision-making process is a search of alternatives and compromises, the authors determines that the success of decision-making process is dependent on flexibility of decision-making process within the port logistics systems, which come through or showed by the form and nature of relations and processes inside port logistics system, the fast adaptation, the flexibility and the expansion of port logistics systems activity, the continuity of decision-making process.

During the analysis of stages of decision-making process the authors noted the great influence of subjectivity of human factor on all decision-making process. It could negatively impact the form and nature of connections and processes in port logistics systems in a view of decision-making process.

By the feedback between consumers and producers through port logistics systems and its decision-making processes it is possible to achieve and keep the business environment balance, which characterized by the competency of process participants, the suitable distribution of human and other resources, its effective use and mobility, grounded by particularities of port logistics systems, by the differentiation opportunity of functions, processes and operations in view of port logistics systems and its decision-making processes.

So, main factors, which describe port logistics systems and decision-making process, must be harmonized. In this case it is necessary to achieve the suitable distribution and mobility of human and other resources in port logistics systems, the compatibility of competences of human resources considering stages of decision-making process and levels of decisions competences, also the decrease of negative impact of subjectivity and other risk factors.

## Conclusions

By the analysis of the process of decision-making and its stages the authors of the article determined, that each stage could be characterized by different expressions of impact factors. In decision-making process first two stages have most important roles, because of its great influence on third stage (physical decision implementation), its quality and the effectiveness of all decision-making process. In this instance the competence of decision-maker and the impact of subjectivity factor, related with distribution processes of resources, take important place in factors complex.

The research showed that port logistics systems ensure the suitable problems solving of transportation, storage and port logistics service, the price system control, the increase of the competitiveness of port activity and the increase of consumption intensity of port logistics services. Moreover, the development of port logistics systems helps to determine and to apply the economic growth disproportion and unimproved opportunities for foundation of the port development strategy. Investment into port logistics infrastructure process ensures the increase of the productivity of port logistics systems and ports competitiveness. Thus, the effective port logistics systems activity allows for the long-term ports competitiveness in a view of global economy and finally for the growth of country's economy.

In case of the necessity to harmonize factors of port logistics systems activity and its decision-making processes, by the accomplished analysis the authors determined main factors, increasing the effectiveness of port logistics systems in an aspect of decision-making theory: the suitable distribution of human and other resources, its effective use and mobility (for example, compatibility of competences and its alternativeness, opportunities of specialization and differentiation of functions, operations, etc.), the level of participants competence in port logistics systems, the opportunity to decrease the impact of subjectivity and other risk factors.

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