

MODELLING CONCEPTS FOR EFFICIENT PORT LOGISTICS MANAGEMENT

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Abstract: Port logistics is a vital element of international shipping and logistics management. The type and scope of port management influences the overall functioning of the international supply chains. Modern approaches for supply chain management, efficient business processes control and information exchange, based on advanced technology, are to be considered synchronously. The present article analyses the organization of port management processes, its components and the information flows with business stakeholders. The proposed conceptual model aims at improvement of port management performance in terms of logistics management, integration and mainstreaming of business processes.

Keywords: MANAGEMENT PERFORMANCE, KEY PERFORMANCE INDICATORS, PORT LOGISTICS

1. Introduction

Maritime ports are vital part of the international supply chain, logistics systems and serve as main connectors between maritime operations and hinterland systems. To improve ports' competitiveness, port management focuses on customer needs, provides value-added services and aims at decrease of costs to achieve higher levels of efficiency. The relationship between global supply chain management and port logistics management requires profound analysis of port logistics business processes. The port enterprise is facing the increasingly complex international trade patterns, the requirements of global terminal operators and transportation companies and other strategic behaviors, which demand integration of inland transport and port logistics system [5]. Establishing management frameworks for improved port logistics performance increases the port enterprise competitiveness. The proposed modelling concepts are based on the quality management theory. The basic elements of quality management system include various components and processes. Strategic planning and operational control are vital for ensuring of efficient quality management practices via cost reductions and increased production efficiency. The present article analyses the structure of port management processes, its components and the processes within the port enterprise. The proposed conceptual model aims at improvement of port management performance in terms of logistics management, integration and mainstreaming of business processes with stakeholders.

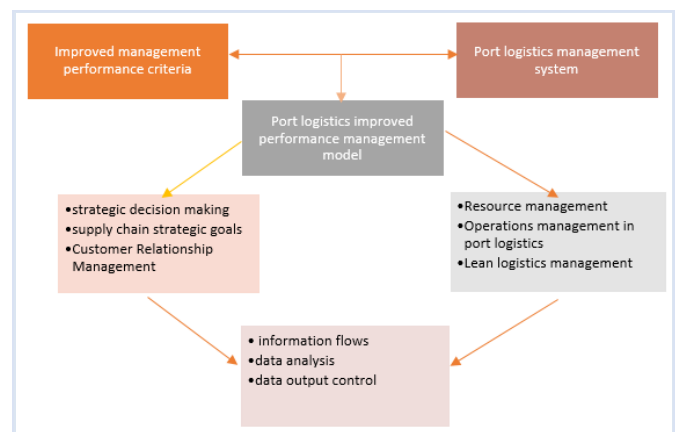
1. Conceptual model for improved port logistics management

Port logistics management is generally focusing on customers and is based on strategies setting efficiency goals both for costs efficiency and time costs reduction. Application of information systems allows for continuous improvement of the system functioning. Effective resource management and the systematic approach to port logistics management require application of certain approaches for optimization of internal processes and production of value-added services. Management of information flows allows for analysis and control at operational level, collecting of data and using data analysis for strategic purposes. Self-assessment procedures, along with the established quality system of the port enterprise, are also factors for improved port logistics management. According to [4] the terminal supply chain integration model is an empirical structural model which includes information and communication systems, value-added services, multimodal systems and operations, supply chain integration practices and other measurement variables [4].

There are several criteria for assessment and development of improved port logistics management model. Strategic decision-making process, linked with supply chain strategic goals are the prerequisite for efficient customer relationship management. On the

other hand, efficient resource management ensures for improved operations management of port logistics processes. Therefore, the core process of resources allocations, management of business processes and achievement of results set the backbone of the port logistics management. Information flows implementation via ICT, data analysis and data output control are the link between the three elements of the core processes. (Figure 1).

Figure 1: Main processes of improved performance model of port logistics management system



Strategic decision system ensures for the establishment of modern port logistics management system. Specific objectives at strategic level and their achievement allow for building of integrated business processes flows as the basis of the decision-making process at management level.

Port enterprises strategic and operational objectives management should be focused on efficient customer relationship management. The latter includes optimization of internal processes according to customer needs, identification of customer values and demand, establishing of certain brand services pertaining to the specific port. Adoption of certain methods for evaluation of customer demand and customer criteria for improved services is part of the overall management system. Port services, standardized by default, should achieve higher level of differentiation to allow for overall efficiency of the customer relationship management processes.

Port logistics system's functioning is based on the available resources – investments, human capital, port infrastructure and superstructure, along with logistics information flows. Strategic goals for resources management in port logistics include establishment of logistics management platform, improvement of the financial control system and corporate investment processes.

Operations management is vital for the logistics systems management. Process management should be based on the total production management concept, forming lean logistics management model basis information technologies for improved model for process management [2].

3. Application of key performance indicators in port logistics management

The established in management theory performance indicators serve as a tool for comparison of performance, provide information of the enterprise functioning and are the basis for establishing relations with the business stakeholders. These indicators are often widely used by publicly owned enterprises to ensure for expenditures transparency. Performance indicators are grouped according to the business processes analyzed. Indicators quantifying output, however, are not very precise in providing information on the businesses processes flows. In the long term, port performance indicators provide a valuable tool for analyzing the factors affecting the port logistics system operations. Furthermore, port management reports to external stakeholders are based on analysis of port performance indicators.

Due to the specialization of port logistics system it is necessary to distinguish between several groups of port products [3]:

- cargo handling and cargo transfer, whereas this type of product is related to handling of ships and providing services to shipping companies;
- logistics product, encompassing warehousing activities, value-added services, cargo inspection, etc. and all activities being focused on logistics companies and forwarding companies;
- port manufacturing product, which includes provision of infrastructure and superstructure for investment in production facilities by international companies.

As ports are the intersection of transportation flows, the cargo handling product is of highest importance. The latter includes operations such as cargo handling, customs procedures, tug services, pilotage, etc. and all activities necessary for the loading and discharging processes to and from vessels and other types of transportation units.

For provision of value-added services many European ports develop logistics centers in close vicinity for optimization of global supply chains cargo flows. As port management strategies include expansion of logistical processes this product allows for higher competitiveness of the port enterprise. As for the port manufacturing product, same refers to specific production activities located within the port premises depending on the types of cargo flows. This product required higher level of external investment and joint ventures with stakeholders thus ensuring for wider variety of added-value services.

The above should be considered interdependently although port users and clients set different requirements for specific port services. The latter is the reason for unbalanced port product portfolio for the medium-sized ports in Europe whereas different ports offer products mainly within a single scope. Table 1 provides a resume of the most important elements of port products.

For the purposes of more detailed analyses of the port logistics performance, specific performance indicators are developed. It should be noted that direct comparison of values of certain port performance indicators of different ports is not precise due to the different market positions of the ports and the scope of port products. Therefore, the internal structure of port performance indicators ensures for provision of a detailed information which is used also for strategic and operational purposes.

Performance indicator	Port performance indicator
Output indicators	* Volume of handled cargo * Added-value services * Investment scope and scale
Improvement indicators	* Market coverage of hinterland areas * Number of liner services * Value of goods handled by the port * Use of EDI
Operational indicators	* Extent of modal shift for hinterland traffic * Customs revenues * Competitiveness of port dues

Table 1. Port performance indicators (adapted from [3])

The volume of cargoes handled in ports is the most widely used port performance indicator. As a rule, the ranking of ports is based on the volumes of cargoes handled with differentiation by cargo type. The values of this type of port performance indicator describe the potential for port development. However, certain limitations apply as concerns volumes of cargoes handled in ports [3]:

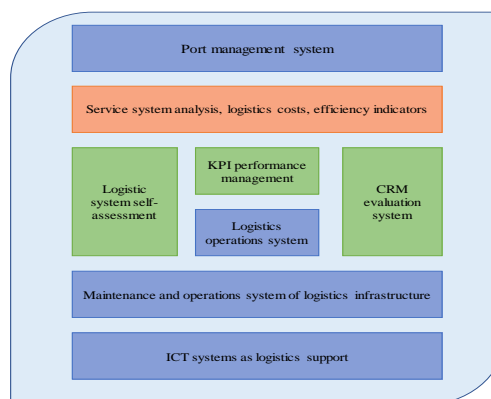
- aggregating the volumes of various cargoes into a single figure distorts the option for comparison of port production;
- volumes of cargo handled do not provide insights on the impact of the port in terms of global supply chains;
- the increase of volumes of handled cargoes is an outcome of global commercial flows and is not entirely based on the performance level of a certain port.

The value-added services port performance indicator quantifies the added value provided by the port activities. The latter indicator is applicable for the evaluation of port economic viability except for the port efficiency.

Market coverage of hinterland areas is achieved mainly via certain marketing strategies through external stakeholders. The attractiveness of the port as considered by major liner operators is based not only on the available infrastructure, allowing for efficient port operations, but on the availability of various added-value services offered. The application of electronic data interchange systems that are compatible with companies' information systems is considered a competitive advantage for the port. The application of port performance indicators is useful for measuring the port development scale and for comparison between ports.

The layout of the improved port logistics management system is presented in Figure 2. The performance management system should be improved based on the new system of port performance indicators. The indicators will allow for profound assessment and quantifying of the logistics system functioning.

Figure 2. Improved port logistics management system



The established logistics center will serve for self-assessment covering all operations. In this way the logistics processes efficiency assessment will be based on evaluation of processes architecture, distribution of responsibility, schedule for reverse response, tracing of bottlenecks and analysis of the results. The communication channels with customers will be improved along with implemented clients' surveys for creating feasible CRM evaluation system for quantifying the efficiency of the port logistics system from customers perspective. As for the cost efficiency, the proposed model structure for improved port logistics management will allow for higher level of analysis that is vital both for operations management and decision-making process at strategic level. Through the analysis of the performance results the pertinent problems can be identified and potential opportunities defined so as to create a well-structured framework for strategic development. The ICT system, as a supportive system for the entire port logistics system, should be further improved and updated.

4. Conclusion

The proposed modelling concepts for improved port logistics management describes a certain set of criteria for enhanced port management system being integrated with contemporary theoretical approaches for quality management. Based on the present article analysis, the improved performance model of the port logistics enterprise will enhance the competitiveness of the port logistics enterprise [1]. The regular internal quality system review ensures for identification of performance failures. The application of the improved port logistics management model will allow for the introduction of the lean logistics concept based on the results at operational level that will allow for analysis and improvement at strategic level. The marketing strategy of the port enterprise will be focused on customer relationship management and will improve the efficiency of the port logistics management. The present article has analyzed and defined the main priorities and concepts for designing of improved port logistics management system. The results show that new approaches are to be applied in port logistics management based on integration of business processes and efficiency of performance.

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