Journal of Business and Economics, ISSN 2155-7950, USA
May 2019, Volume 10, No. 5, pp. 387-394
DOI: 10.15341/jbe(2155-7950)/05.10.2019/003

http://www.academicstar.us

The Use of Port Performance Indexes in the Transport Economy and the Strengthening of Port Competitiveness

Astrida Rijkure
(University of Latvia, Latvia)

Abstract: Ports in the transport economy have an important role to play in the competitiveness of ports. There is an increasing climate of competition, which causes ports to invest in development and to improve their transport corridors, governance principles and pricing policies in order to strengthen international competitiveness of ports and to ensure that their management practices are in line with the positive international experience. In order to increase the efficiency of transport, to promote the use of environmentally friendly technologies and to improve the international competitiveness of port transport corridors, it is important for ports to determine their own KPI indicators that would be used to assess port performance indicators. As ports are responsible for the quality assurance of port services, even if they do not provide such services, monitoring and assessing of the KPI must be part of the quality assurance process. The objective of this study is to define the port performance-enhancing KPI indexes and to make suggestions for how KPI application in the transport economy can strengthen the international competitiveness of ports and ensure that their management practises international experience. The study's tasks are to define the appropriate KPI indexes, group them according to interlinked principles, and provide proposals on how to use them to improve the international competitiveness of ports and the main transport system multimodal integration.

Key words: KPI; port performance; transport economics
JEL codes: R40, R42, R49

1. Introduction

Information about the activity and efficiency of ports is scarce, but it is valuable for the common development of ports. Ports require analytical information to monitor their operations, as well as information on the competing ports for planning purposes. In turn port users require information to make informed choices, about which of the port's services to use. Analysis of information allows one to monitor whether the strategic objectives are observed, and at the policy level it provides a panel for informing the national and regional policy makers on the trading status of the port industry and shipping.

The economic efficiency is the economic indicator that characterises the result obtained from the used funds. The efficiency is determined by attributing the obtained result (profit) to the used resources that have been necessary to obtain the result (profit). Society is interested in achieving more efficient production, since it will be able to better meet its needs, as well as the needs of each individual in the context of limited resources. By

Astrida Rijkure, Dr., University of Latvia. E-mail: astrida.rijkure@gmail.com.

effectively using limited resources, products will be produced using less labour, financial and capital resources, thus the key issue of the economy — limitedness — will be better addressed.

Assessment of port efficiency helps to confirm the new strategic development directions, to monitor their effective performance and achieving of the desired results, as well as to plan the long-term development of ports. Assessment of efficiency is related to the measurements of port productivity or performance indicators, which means that the port needs to provide maximum throughput to maximise the volume of cargo served, utilising minimal resources and maximising the profitability of the provided services.

In order to ensure the most efficient port services, it is necessary to assess the performance of the port (Key Performance Indicators, hereinafter – KPI) — input data: capital, work, infrastructure, output data: the volume of cargo serviced.

A Key Performance Indicator is a measurable value that demonstrates how effectively a company is achieving key business objectives. KPIs can be used to evaluate how successful a company is at reaching specific targets. A high-level KPI may focus on big picture performance goals, while a low-level KPI may focus more on the daily processes in each department of an organization — such as marketing or sales (Sarwar N., 2013).

KPIs are key measurements in all dimensions that will characterise the achievement of the desired goal.

Clear objective — Only those indicators that best illustrate the goals are selected.

Along with time, you can determine the desired measurement size, interval.

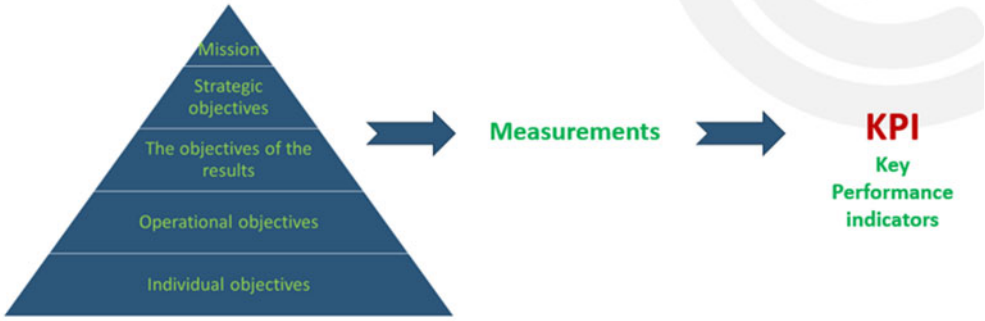

Figure 1 FORCEO Goals Model (Author's Construction, Based on Juntunen S. M., 2017)

Mission denotes the highest objective of the organisation, its meaning and place of existence in the world. The strategic objectives indicate the desired state of the external environment. What is the effect that we want to achieve?

The objectives of the results indicate the result visible outside the organisation that should be created to achieve the strategic objectives. They are measurable. The objectives of the results are the tasks of the strategic goals.

The operational objectives indicate what to do to achieve the objectives of the results and how. They are determined differently for processes and projects. Operational objectives are the objectives of the target results (Port Indicators System: Methodology, 2016).

The individual objectives specify what should be done by a particular employee. They result from the processes and projects, in which the employee participates. In addition they indicate which competences should be developed.

Given the importance of the port industry and the need for specific indicators, in this study a system of port

performance indicators has been established, which allows us to identify the potential for the greatest return compared to other international standards in the ports. It will also make it possible to determine the impact of the improvements made in the ports to their operations. Analysis of KPI indexes will promote competitiveness and help reduce the areas in which the national port system is lagging behind.

The task of this study is to identify the possible performance indicators that will assess the impact of the port system on the society, the environment and the port economy.

For port terminals, measuring KPIs to improve operational efficiencies and productivity is crucial. With vessel sizes on the rise, shipping companies are more demanding than ever. However, selecting high-quality KPIs isn't easy. The best way to evaluate the relevance of a KPI is to use the SMART criteria (Port Management Series: Port Performance, 2016).

Acceptable and feasible Key Port Performance Indicators to measure the impact of the European Port System on society, environment and economy:

- Market trends and structure (Market Share, Maritime traffic, Vessel Traffic, Container dependency, Herfindahl-Hirschman Index (HHI), Call size);
- Socio-economic impact (Financial health, Investment, Employment (Direct & Indirect), Added value (Direct & Indirect), Direct Gross added value per FTE);
- Environment (Total water consumption, Total energy consumed, Amount of waste, Existence of monitoring programme, Carbon footprint);
- Logistic chain and Operations (Availability of Port Community Systems, Ship turnaround time, Mean-time customs clearance, On-time performance, Maritime and Intermodal container connectivity);
- Governance (Port authority investment, Market openness, Integration port cluster, Port authority employee productivity, Existence of Performance Measurement, Autonomous management, Extent of performance management).

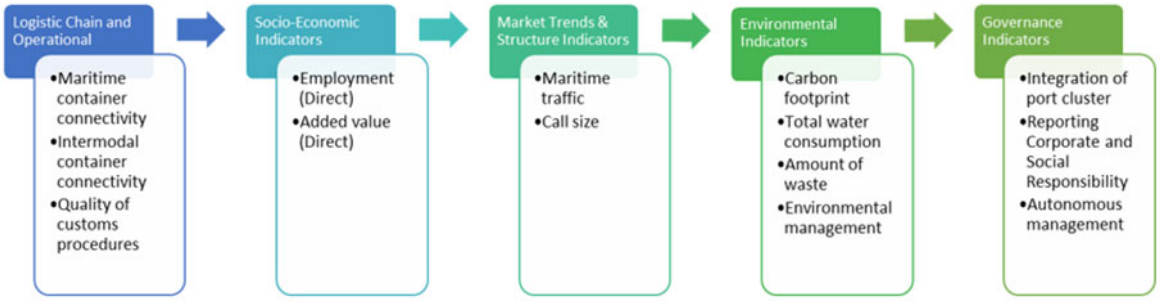

Figure 2 ESPO Port Perfprmance Criteria (Author'S Construction, Based on Port Performance Measurement in Practice)

2. Logistic Chain and Operational

With the help of maritime and inland connection indicators, it is offered to assess the existence of the connections in order to meet the expectations of the customers. In the calculation of the indicator, it is proposed to assess the existence of connections in the context of Europe and the entire world, rather than in the view of a specific port or region. On time performance indicators, in turn, can help assess whether the port operations are carried out within the specified time limits. When assessing the aspects that affect the performance rate of the activities, it is possible to take measures to improve On time indicators, if necessary. The indicator of time spent

for customs control gives an idea of how easy or complicated the customs procedures are for the port, and how they affect the efficiency of the overall logistics chain. Accordingly, the existence of a port association system indicator provides whether a port has a data exchange system to increase the efficiency of the port's processes (Bentaleb F., Mabrouki C. & Semma A., 2015). The time spent by the ships in the ports is considered an indirect indicator, which provides the efficiency of the port's operation.

2.1 Socio-Economic Indicators

The indicators of socio-economic impact, such as employment and value added indicators are important to demonstrate the economic contribution of the port to the city, region and state in general. The socio-economic indicators can be used as criteria for allocating funding for infrastructure improvements during the particular planning period in the transport sector. The author considers that these indicators can help persuade potential investors to invest financial resources and to develop their businesses in the particular port. Employment indicators accordingly help to assess the jobs created as a result of the port activities in the particular region. The European Commission proposes to assess the employment rates in the context of the volume of reloaded cargo and the created value added (Metalla O., 2015). The value added indicators accordingly provide insight into the contribution of port activity to GDP.

2.2 Market Trends & Structure Indicators

Port indicators relating to market trends and market structures are intended for internal use of the industry in the context of development and competitiveness. Market trend indicators would allow the port authorities and the European Commission to monitor the development of port capacity and cargo concentration, the level of differentiation at the various geographical levels of the port systems, as well as in different market segments. The indicator for maritime transportation is selected to analyse the port traffic by calculating the volume of cargo or passengers, being reloaded and serviced in the port in the given time period (Vitsounis T., 2016). According to the author the indicators of the market trends and structure can be used as key elements for developing port development strategies, as well as the common sector policies in a particular country or region. At the same time the calculation and disclosure of these indicators would ensure greater public understanding of the role of ports in the particular country or region.

2.3 Environmental Indicators

Like any other organisation, ports also have the task of controlling the environmental impact of their activities. The calculation and assessment of the environmental indicators over a given period of time is essential to find out whether specific activities lead to positive or negative environmental changes. With the help of the consumed energy indicator, for example, the amount of natural gas, fuel, as well as the amount of electricity is identified that is used for the provision of port operation. The author believes that by comparing the amount of energy consumed, the ports can draw conclusions and develop action plans in order to use their activities more for the provision of renewable energy resources, thus reducing their negative impact on the environment. Systematic monitoring of the total water consumption indicator can help to use water resources more efficiently for the provision of port activities. Effective use would also reduce the total costs of water consumption. In turn, the carbon footprint is a means to measure the amount of greenhouse gas emissions directly or indirectly caused by the operation of the port. An indicator of the existence of an environmental protection plan and its control system demonstrates whether a plan for environment protection in the relevant port has been developed, as well as whether a control system has been developed that defines the processes and activities for describing and monitoring the environmental quality in the port. The waste quantity indicator demonstrates how much waste is

generated according to their types – hazardous waste and non-hazardous waste. The assessment of waste quantities may indicate the measures that the port has or has not taken to reduce the quantity of waste. In turn, the list of strategic environmental aspects includes activities, products, services, etc., which have a direct or indirect impact on the environment.

2.4 Governance Indicators

It is suggested to analyse the indicator of the investments made by the port authority in the context of cargo turnover in the port, but it might be difficult to assess the cargo turnover in terms of money. The indicator would help the port authorities to assess, whether the investments in port development have increased cargo turnover in the port. The indicator of port cluster integration is used to determine whether a system has been established in the port — a cluster for uniting different stakeholders. The market transparency indicator expresses the degree of market transparency in the port.

The port performance scoreboard indicator can help assess the status, at which the port authorities are currently assessing their performance results, or whether the port authorities are assessing market trends and structural indicators, socio-economic indicators, environmental performance indicators, logistics chain indicators, as well as port management indicators. In turn, the port performance scoreboard indicator accordingly demonstrates whether the port does/does not have a comprehensive system complex, with the help of which the overall port performance is assessed, including the assessment of performance indicators, quality standards, customer satisfaction, etc.

These criteria set by ESPO are not sufficient to assess the port's performance or efficiency. The author has defined her set of performance indicators, which are in synergy with each other and form effective port activity, pointing to port development or growth.

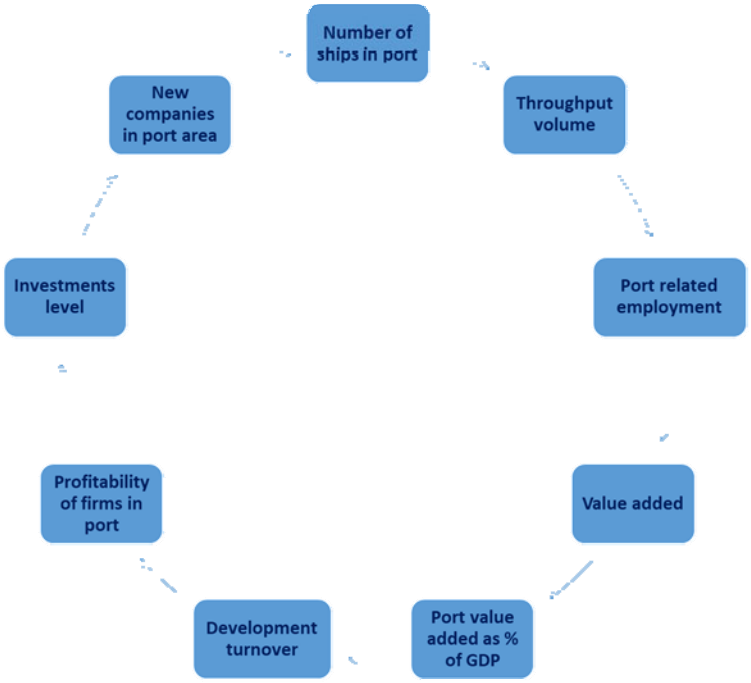

Figure 3 Port Development Performance Indicators (Author'S Construction)

2.5 Thoughput Volume

Port throughput performance and cargo turnover are indicators that primarily characterise the importance of the port and allow it to be compared with other ports in the region, both by commodity sectors and product groups, as well as by the total volume of reloaded cargo. These are the primary indicators that characterise port performance.

2.6 Number of Ships in the Port

The number of ships serviced in the port directly affects the port cargo turnover, but at the same time nowadays the number of ships serviced at the port is decreasing, while the number of tonnes serviced is increasing and it is possible because of the rapidly changing fleet – the vessels are becoming larger and they can transport more and more goods.

2.7 Port related Employment

Changes in the number of employees do not have a direct impact on cargo turnover in the port. The port authorities are conducting quality management and optimise the number of people employed in the port, redistributing the responsibilities and functions, thus reducing the labour costs. Port authority employees do not directly affect port cargo turnover, but they have an indicative effect on port cargo turnover. Of course, from a national point of view, it is important to increase the number of people employed in the port, and it must be implemented by expanding the range of services provided or by opening new plants.

2.8 Value Added

The value added of the provided port services is an indicator that must definitely increase, when viewed over a period of time. Because the value added is the amount that is the port's direct return — the more efficiently the port works, the more value added it can bring. The value added directly depends on the value of the goods handled, the type of service or the value of goods produced in the port. The value added of the cargo is measured not in tonnes, but in terms of money. This value added cannot be created by providing transit services; they must be replaced by complex logistics solutions: storage, assembly, labelling of the goods, etc. As the tonnage approach needs to be changed, we have to look at the cash value of the goods.

2.9 Port Value Added as % of GDP

The logistics industry and namely the port operations play an important role in the economy; along with the transport services provided, it forms the % impact on GDP. It should be emphasised that transport and logistics are related to the entire economic circulation. Everything that is manufactured is transported to the consumer – both the local and the foreign consumer. And the more that ports provide services, the greater contribution it brings to the GDP.

2.10 Development Turnover

The capacities of the logistics system are not yet fully used, which means that there is still room for growth. And by developing new port areas and by expanding the range of services provided, it is also possible to develop port cargo turnover.

2.11 Profitability of Companies in the Port

Profitability, return or earning capacity is an indicator of the company's ability to perform such economic activity that is profitable. The profitability indicator can be used to analyse how the investments will be reflected in the future profits. Low profitability suggests possible problems in the company's development, which without solving them may result in insolvency.

2.12 Investment Level

The attraction of investments to a port is not only the task of the port authority, but also the responsibility of the companies that work in the port. The task of the port authority is to create a favourable environment for the attraction of investments. The simplest formula for GDP calculation shows that investments are one of the components that increases along with the increase of GDP. In addition to local investments, the ports are also interested in attracting foreign direct investments (FDI). As both foreign and domestic investors seek to maximise the return on investment, the investment environment factors that they regard as important and capable of delivering this return are unlikely to be different. However, foreign investors are more interested in obtaining new information on the availability of major business factors in the area, unlike local companies that are better aware of the local situation. Therefore, those that make FDI and are looking for conditions that are provided by their home country, are evaluating the environmental factors more actively. Today, projects of EU Structural Funds provide invaluable contribution to the development of the ports and the increase of investment returns.

2.13 New Companies in Port Area

The acquisition of new markets and the attraction of new investors to the port often also lead to the development of new businesses directly in the port. The very starting of new businesses not only adds extra cargo or goods produced to the port, but also creates new jobs and the amount of taxes paid. Therefore this is a very important performance indicator for each port that points to growth.

The assessment and analysis of these criteria allow the port authorities to make important decisions and to draw conclusions as to whether the structure of the cargo is appropriate to the market conditions, whether diversification of the cargo structure is required, or whether additional production capacity should be acquired by investing in the development of the territories.

3. Conslusion

The port authorities must conduct regular monitoring of data to assess the port's performance and to compare the data of their port with the performance indicators, infrastructure, output, capacity and development potential of other ports. In this process, it is very important to have a sufficient set of data in order to be able to analyse what can be achieved through the operation of a good port information system. Important work should also be performed by the port authority in cooperation with the policy makers, whose primary function is to promote the modernisation and consolidation of the port system, by developing and implementing policies, strategies and initiatives that improve the use of infrastructure, improve the services and strengthen the competitiveness of ports, while simultaneously monitoring the corporate integral rights of the port administrators applied by the government. Currently the ports are subject to global competition and on the basis of analysis, a number of indexes and indicators implemented by international organisations, such as the World Bank and the World Economic Forum, the port authorities can carry out both qualitative and quantitative analysis focusing on the perceptions of different members in the logistics chain regarding the transportation and distribution of goods. The proposed methodology significantly differs from other international indexes, given that it is based on the development of a set of interrelated quantitative indicators that includes the various links of objective synergy between the port and the transport logistics chain. An important element that is required to make the port indicator system effective is to provide an annual continuous flow of data and information that would guarantee long-term viability of the system.

Acknowledgment

ERDF project No. 1.1.1.2/VIAA/1/16/061 “Long-term impact of blue economy on the increase of the competitiveness of ports in the Baltic Sea region”.

References

Bentaleb F., Mabrouki C. and Semma A. (2015). *Key Performance Indicators Evaluation and Performance Measurement in Dry Port-Seaport System: A Multi Criteria Approach*, pp. 13-18.

European Sea Ports Organization (ESPO). (2012). *Port Performance I Port Performance Indicators Selection and Measurement Indicators*, pp. 4-9.

Juntunen S. M. (2017). *Key Performance Indicators of Transportation Category Management*, pp. 25-29.

Metalla O. (2015). “Defining the most important port performance indicators: A case of Albanian ports”, UK, pp. 16-28.

Department of Transportation Integration Mexican Institute of Transport Secretariat of Communications and Transportation (2016). *Port Indicators System: Methodology*, pp. 47-54.

Port Management Series: Port Performance (2016). *United Nations Conference on Trade and Development*, pp. 45-50.

Sarwar N. (2013). “Time-related key performance indicators and port performance: A review of theory and practice”, Faculty of Technology and Maritime SciencesVestfold University College, pp. 22-35.

Vitsounis T. (2016). “Port performance measurement in practice”, accessed on 07.10. 2018, available online at: http://www.porteconomics.eu.