JUSTIFICATION OF BUSINESS ENTITIES DEVELOPMENT BASED ON INNOVATIVE PRINCIPLES

Dmytro Solokha, Kyiv National University of Culture and Arts
Liudmila Sotnichenko, National University (Odessa Maritime Academy)
Svitlana Bessonova, Pryazovskyi State Technical University
Alla Kravchenko, Azov Maritime Institute
Makarenko Maryna, Azov Maritime Institute

ABSTRACT

The article substantiates the importance of managing the innovative potential of modern enterprises, for example, a maritime trading port. Based on the consideration of the practices of world and domestic ports, a dialectical link between the development of the enterprise and its innovative potential has been proved. An assessment scale has been developed by which the degree of conformity of the innovative potential to the level of enterprise development is established.

Keywords: Innovation Potential, Competitive Development, Competitive Advantages, Components Of Innovation Potential, Expert Assessment.

JEL Classifications: M21.

INTRODUCTION

Today the development of port economy of the country is complicated by several factors, including: competition from foreign ports that constantly reinforced in recent years, globalization of the economy that deepens the world specialization, requirements for reducing transport costs for transportation and improving the environmental safety.

The port should be able to develop during the cargo flows growth, master the cargo handling with minimal time and finances compared to its competitors to operate effectively. Competition in ports sufficiently dynamic has a large number of participants, that acting independently or as part of large transnational transport corporations and respectively has more opportunities for development.

Improving the quality of services in such circumstances is a key tool for obtaining victory in the competition. The creation of additional competitive advantages is possible only by using the innovation activity in its technology. Providing and development of innovative potential of the port is the main strategic task. Its successful solution is important not only for enterprise but also for increasing of economic growth. So, today the activity of sea commercial ports must meet the criteria of innovation development that brings global business environment. Without this it is impossible to carry out integration into the world transport system with the preservation and expansion of own impact on the developed foreign countries.

REVIEW OF PREVIOUS STUDIES

Effective use of innovation potential requires constant search for ways to improve and strengthen it. Leading researchers (Freeman, 1982; Rothwell & Gardiner, 1985; Drucker, 2009; Schumpeter, 2008) offer a number of ways to improve the innovation potential: the development of new technology and technologies; introduction of the most progressive technologies of storage of raw materials and resources; development of progressive forms of organization of production; technical restructuring of enterprises; continuous improvement of the level of qualification of personnel of all categories according to the modern level and directions of knowledge; optimization of the personnel structure of the personnel. So Chukhrai & Lisovska (2016) argue that the innovation potential forms two main elements: the material resources of innovation activity and intellectual potential. Chukhno (2015) highlights the innovation potential of material resources and intellectual potential. Other researchers in their researches focus on the peculiarities of the technological potential of companies (Tetiana et al., 2018a: 2018b). Many researches are devoted to the strategic resource of the enterprise-the staff as a component of the innovation potential (Nakashydze & Gil'orme, 2015). But, in our opinion, these definitions do not fully reflect the factors that influence the formation and use of these components, which requires clarification of the definition of the structure of innovation potential.

METHODS

The main purpose of the article is the research and justification of the link between the entities competitive development on the example of seaports and their existing innovation potential.

The expert analysis and statistical simulation have been used in the research. Separation of the factors of the company's innovation potential was carried out on the basis of expert analysis. The elements of the Ishikawa concept in constructing Fishburne have been used while calculations. The formation of an expert group was carried out on the basis of a competent approach, taking into account the rank of positions this allows forming a group that, in accordance with official duties, has the opportunity to build a system for assessing innovation potential in accordance with the objectives of the enterprises. The method of assessment of the competence of experts is the mutual evaluation of competence based on the method of pair-wise comparison. A pair-wise comparison is a procedure for setting up preferences for objects when comparing all possible pairs and further organizing objects based on comparison of results (Tuyen, 2010). According to the results of the competence assessment, a matrix of competence of the experts is formed, the elements of which are the ranks. This matrix shows the qualification of the expert according to judgment. But the use of mutual assessment of expert competence is possible with the following assumptions: lack of conformism among experts-influence of authorities on judgments; friendly relations; availability of knowledge about the professional competence of each expert. We have chosen a self-appraisal competence assessment method that does not require the study of informal expert communication.

The use of statistical simulation allowed determining the impact of innovation potential on the competitive development of commercial ports. In the calculations, the program Statistica 10 was used.

RESULTS AND DISCUSSIONS

Innovative potential of ports gives them opportunity to occupy leading positions in the field of high quality services for cargo processing in the world. In addition, the maritime industry enterprise may be able to change even the "*rules of the game*" in the market. But innovation potential is characterized by rapid dynamics so, that today is an innovative knowledge, tomorrow will be fundamental inevitably. Therefore, protecting and improving the competitive position requires continuous learning and perception of knowledge and rapid innovation implementation. This fact makes the connection between the desire of the port development and getting innovations.

International practice knows many enterprises of maritime transport: PSA Port Authority of Singapore (Singapore); Port of Los-Angeles (Los Angeles, USA); Port of Rotterdam (Rotterdam, Netherlands); Shanghai international port (Shanghai, China), which during a considerable time successfully used in their activity innovation potential and received positive results. Innovative potential management has fluencies on the improvement of many components of competitive advantages of sea commercial ports. For example, an American consulting firm KPMG was carried out the research and obtained the following data about the impact of innovations on various indicators of activity the ports of America, Europe and the Middle East (Figure 1).
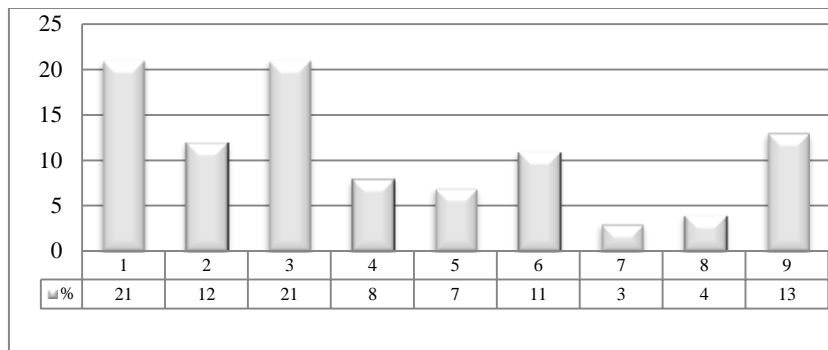

%	1	2	3	4	5	6	7	8	9
%	21	12	21	8	7	11	3	4	13

FIGURE 1
THE LEVEL OF INNOVATION IMPACT ONTHE INDICATORS OF ACTIVITY OF PORTS OF AMERICA, EUROPE AND THE MIDDLE EAST

Source: Based on Sait Konsaltingovoi Firmi KPMG.

Note: 1-Labor productivity; 2-Quality of services; 3-Processing speed of ships; 4-Reduction of accidents; 5-Customer satisfaction; 6-Satisfaction of employees; 7-Revenues; 8-Costs; 9-Business reputation.

As shown in Figure 1, increases productivity, speed of processing of vessels, employee satisfaction, business reputation of port, but at the same time, there are some downsides. After reviewing the features of innovative activity of the largest ports in the world, it is appropriate to make a summary assessment of the competitive advantages which ports received from innovation applying. Table 1 shows the summarized results.

Table 1 INDICES OF ACTIVITY THE LEADING PORTS IN THE WORLD BY 2015 (COMPILED BY THE AUTHORS BASED ON)				
Characteristic	Singapore	USA	Netherlands	China
The growth rate of profits (%).	6.3	5.4	6.2	7.8
Total cargo turnover (thousand metric tons per year).	503,342	157,800	429,926	590,000
Cargo turnover, thousand tons/m (counting on 1 m of berth).	29.0	16.2	10.7	29.5
The average time the ship is in port (year).	6	<12	4.37	No information
Number of contracts with educational institutions, units.	3	2	5	1
Number of agreements on cooperation in the field of technological development.	34	7	4	No information
Customer Satisfaction Index (CSI).	6.9	No information	7.2	No information
The number of accidents (incidents).	0.03	No information	0.004	No information

Consideration of practice of applying of innovation in activity of the four largest ports in the world leads to the conclusion about the growth of their competitiveness, because, as is evident from the Table 1, they show high indicators of its activity. Innovations become an important resource and competitive advantage for ports. Therefore, question of management of innovation potential has great importance.

The value of innovation potential and its components for commercial seaports vary during the relevant period and replaced under the influence of external and internal factors. Justification of link between competitive development of commercial port and innovation potential requires relevant statistical and heuristic research. Simple statistical methods in combination with well-developed intuition and common sense are usually most successful when assessing the strategic potential of the region and its components. At the same time formal use of "*accurate*" assessment methods may give poor results if they are used for unreliable statistical base. The last is eliminated by using professional experts who have the knowledge and ability to think.

Obtaining the objective assessments based on these general provisions:

1. The axiom, which states that the opinion of the majority is competent.
2. The axiom of transitiveness that states that the subjective assessments are transitive.

This implies that their dispersion is a measure of quality of subjective assessments.

The sources of errors of subjective assessment include:

1. The insufficient awareness of the expert associated with inaccurate formulation of tasks of assessment, uncertainty and ambiguity of used terminology, lack of effectiveness of the proposed scales of assessments; badly composed the expert questionnaire.
2. The lack of competence of the expert, due to too high degree of difficulty of tasks, lack of totality of its scientific hypotheses and specific ideas about the nature and behavior of the object of examination, a little scientific inquisitiveness.
3. The lack of objectivity of the expert because of unwillingness to participate in the examination, the availability of its direct interest in the results of some specific expertise, the presence of moral pressure on expert by some people, the lack of material incentives, lack of scientific interest and opportunities to increase scientific, technical or other expert skills from the work, greater complexity of filling out forms, etc.

4. The insufficient number of expert opinions related to errors of questionnaires, construction of the examination process; lack of experts.

Thus, actions for obtaining reliable estimates is to eliminate sources of error that are mentioned above. Methods of implementing these measures are determined by resources that are available to the person conducting the examination (time allotted for the examination, the number of experts, etc.).

Formally, any examination can be divided into three stages: preparation, holding and processing of results.

The stage of expertise preparation strives to create conditions for obtaining an objective and accurate assessments of alternatives. It usually includes:

1. Determination of expertise tasks.
2. Drawing up a questionnaire on which experts will be interviewed.
3. Determination of the scale of assessments that experts should use.
4. Determining the composition (the list) of experts involved to participate in the examination.
5. Determining the order of examination, indicators of assessments competence (characteristics of their accuracy) and results processing.

The application of mathematical and statistical techniques significantly expands possibilities of usage the information obtained from experts. The practice of recent years showed that even simple statistical methods in combination with this information when selecting promising solutions often lead to more successful results than "*accurate*" calculations with a focus on averages and extrapolation of current trends.

Using of information obtained from experts, particularly productive if for its collection, synthesis and analysis using special procedures, logic techniques and mathematical methods, known as methods of expert opinion. Thus, in our further studies will be based on heuristic evaluation methods. As experts were selected leading experts of marine economy of Ukraine in the amount of 25 people.

So at the level of port control expected to assess the significance of components of innovation potential to provide a competitive development of the last one. There are such items that included the investigated list of components as: (1) intellectual, (2) human resources, (3) market, (4) institutional, (5) informational, (6) potentials and financial, (7) investment, (8) communications, (9) research, (10) technical, (11) organizational, (12) technology components. Each of these elements has been assessed by skilled experts. Further, on the basis of the ranks from experts based on Fishburne formula were calculated weights of each component.

It is possible to record expression of the general index of port innovation potential after calculating the weight coefficients:

$$IP_g = w_1 P_1 + w_2 P_2 + w_3 P_3 + w_4 P_4 + w_5 P_5 + w_6 P_6 + w_7 P_7 + w_8 P_8 + w_9 P_9 + w_{10} P_{10} + w_{11} P_{11} + w_{12} P_{12} \tag{1}$$

Where,

IP_g – general index of port innovation potential.

$P_1, P_2, P_3, P_4, P_5, P_6, P_7, P_8, P_9, P_{10}, P_{11}, P_{12}$–components of the innovation potential. $w_1, w_2, \ldots, w_{12}$,–weight coefficients of the corresponding component of port innovation potential calculated by the Fishburne method.

The next stage in assessing the innovation potential and its impact on the competitive development of the port was initiated from the assessment of the level of development in the ports of each component (n $\in$ [1; 12]) of potential (p_n^{pp}) and the extent of its impact on the competitive development of ith port (B_n^{Bp}). This evaluation takes place for each individual port by professional experts. The assessment occurs through questionnaires on a ten scale, where, 1-minimum score; 10-maximum score.

The assessment procedure ends with matching the value of the overall index of innovation potential of competitive port development that happens interval using the following scale: [0-20]–no match; [21-40]–correspondence below the average; [41-60]–the average compliance; [61-80] –compliance is higher than average; [81-100]–compliance is high enough.

The calculations to justify the link between the innovation potential and competitive development of ports carried out for five leaders. So, establish by the expert way the weight coefficient for each component of innovation potential of ports. Was conducted the ranking of assessment results of each component of innovation potential according to obtained total points and by the Fishburne formula calculated the weight coefficient of each component of potential (Table 2). Columns 3 and 4 of Table 2 shows a rank assigned to each component of the potential and defined coefficients. Based on these data is possible to record a general formula for calculating the index of innovation potential of the port.

Table 2 THE RESULTS OF THE EXPERT SURVEY TO DETERMINE THE VALUE OF EACH COMPONENT OF INNOVATION POTENTIAL (CALCULATED BY THE AUTHORS)			
Components of potential	Total amount	Rank of component	The weight coefficient
1	2	3	4
1	268	1	0.15
2	216	10	0.04
3	263	6	0.09
4	264	5	0.10
5	213	12	0.01
6	256	9	0.05
7	266	3	0.13
8	262	7	0.08
9	214	11	0.03
10	265	4	0.12
11	267	2	0.14
12	261	8	0.06
In general	3,015		1.00

Thus, the results of the evaluation, intellectual, institutional, technical members are the most important for the competitive development of ports. Obtained data concerning the weight coefficients of components of the innovation potential of ports allowed recording the following formula of total integrated innovation potential of the port (IP_g):

$$IP_g = 0.15\ P_1 + 0.04\ P_2 + 0.09\ P_3 + 0.10\ P_4 + 0.01\ P_5 + 0.05\ P_6 + 0.13\ P_7 + 0.08\ P_8 + 0.03\ P_9 + 0.12\ P_{10} + 0.14\ P_{11} + 0.06\ P_{12}$$

(2)

Analyzing the estimates obtained from experts, it is often necessary to detect concordance concerning the consistency of their thoughts on several objects (components of potential), which show the impact on a final outcome (competitive development).

In the case of a large number of experts (25 people) calculations consistency of thoughts by paired comparison methods are extremely labor intensive. Therefore, in these cases coordination of opinions (agreement) of experts evaluated using the concordance coefficient W, the overall rank correlation coefficient for group consisting of m experts.

Substituting our values, we get W=(124,963*12)/5,003,856=0.3.This coefficient was significant for the significance level 0.99 (99%), it is possible to say that there are not accidental consensus of experts opinions. The value of the concordance coefficient by Kendall was tested in the program Statistica 10.

Conducted analysis also confirmed the high consistency of expert opinions: concordance coefficient by Kendall was 0.65 (mean rank correlation is 0.65).

It was also checked correlation connection of strategic potential elements by the Kendall coefficient.

The obtained data lead to the conclusion that the consensus of expert opinions varies in small limits. Satisfactory results were obtained for all components of the innovation potential. So coefficients of concordance listed above, calculated accordingly to Kendall, Spearman and performance variations, confirming the accuracy and consistency of obtained data, so we can use them to further study. The next stage of the study involves the assessment of conformity of innovation potential of port to the level of their competitive development (Table 3).

Table 3
SUMMARY OF THE RESULTS ON THE ESTABLISHMENT OF INNOVATION POTENTIAL IMPACT ON THE COMPETITIVE DEVELOPMENT OF COMMERCIAL PORTS (CALCULATED BY THE AUTHORS)

	Mariupol			Illychevsk			Mykolayiv			Odessa			Yuzhny		
	p_n^{pp}	$B_n^{вр}$	IP_g	p_n^{pp}	$B_n^{вр}$	IP_g	p_n^{pp}	$B_n^{вр}$	IP_g	p_n^{pp}	$B_n^{вр}$	IP_g	p_n^{pp}	$B_n^{вр}$	IP_g
1	6.20	6.20	5.36	5.80	8.00	8.35	6.80	8.60	11.34	9.87	9.13	18.52	9.80	9.87	21.46
2	7.07	8.20	0.76	4.87	6.20	0.30	7.20	7.73	0.69	8.80	8.13	0.93	7.87	7.80	0.77
3	7.07	9.07	4.71	8.13	8.07	4.29	4.80	7.80	2.37	8.80	9.80	6.85	6.80	7.13	2.80
4	3.20	8.80	2.48	8.73	8.87	6.88	5.60	7.80	3.42	8.93	8.20	6.00	9.87	9.87	9.60
5	3.27	6.93	0.02	6.33	8.93	0.05	8.13	7.20	0.04	9.87	9.20	0.08	9.87	7.27	0.04
6	8.13	6.87	0.96	6.67	9.00	1.35	7.80	8.13	1.29	9.80	9.87	2.38	6.80	9.80	2.37
7	4.20	6.87	3.35	6.80	7.20	5.96	7.00	6.13	4.45	9.87	9.20	14.11	9.87	9.20	14.11
8	8.93	6.80	2.65	5.87	6.13	1.41	6.87	7.20	2.28	9.73	9.20	5.27	8.87	9.13	4.73
9	8.93	5.93	0.28	6.20	6.00	0.20	7.80	6.67	0.31	7.73	7.07	0.35	7.87	7.73	0.42
10	7.13	7.20	5.33	5.13	8.07	4.81	7.73	7.67	6.56	8.80	8.07	8.25	9.80	9.87	13.74
11	7.20	7.13	7.18	6.67	7.20	6.78	7.07	8.60	10.25	8.87	7.73	10.40	8.27	8.13	10.71
12	7.93	6.13	1.07	7.20	6.27	1.02	7.80	5.80	0.94	7.87	6.87	1.34	3.87	7.97	1.75
Total			34.14			41.41			43.94			74.48			82.51

Using the proposed scale of evaluation of the results allows analyzing the overall index of innovation potential. Comparing the data with the proposed scale of correspondences of innovative potential to competitive potential of the port, it was found that the very high compliance has the potential of Port Yuzhny (82.51) and the lowest–Mariupol sea port (34.14).

CONCLUSIONS

The process of developing options for the future competitive development of the port is complex, and at each stage it needs its approaches and methods. From the availability of complete and reliable information at the initial stage of assessing innovation potential, the decision of the problem of increasing the competitiveness of the port depends in many respects.

The results obtained in the study confirm that there is a direct dependence of the competitive development of ports on their innovative potential that they have.

For example, the high estimates of the innovative potential of the port (which is confirmed by the belonging to the proposed scale of assessment) allow us to make a decision on consolidating the selected port development program. In case of low estimation of innovative potential it is possible to establish at the expense of which component it happened and how it affects the competitive development of the port. The following actions are corrected by the corresponding program of competitive development of the port and the development of the components of its innovative potential. The proposed procedure for assessing the port's innovative potential and determining the impact of each component of the potential on its competitive development can become a convenient tool for managing modern ports not only in Ukraine but also beyond its borders as it is a convenient and transparent tool for managing the innovative potential of the port.

Prospects for further research are the construction of a matrix of managerial decisions on the development of innovation potential of companies based on the integral indicator of innovation potential calculated in the article. This will determine the vectors of influence on the components of the innovation potential, form groups of restrictions on its growth (financial, personnel, investment, technological, etc.) in order to maximize the company's profits.

REFERENCES

Chukhno, I.A. (2015). Innovation approaches in the management of regional development.

Chukhrai, N.I., & Lisovska, L.S. (2016). Economics of innovation enterprise.

Drucker, P.F. (2009). Business and innovation.

Freeman, C. (1982). The economics of industrial innovation.

Hilorme, T., Nazarenko, I., Okulicz-Kozaryn, W., Getman, O., & Drobyazko, S. (2018). Innovative model of economic behavior of agents in the sphere of energy conservation. *Academy of Entrepreneurship Journal, 24*(3), 1-7.

Nakashydze, L., & Gil'orme, T. (2015). Energy security assessment when introducing renewable energy technologies. *Eastern-European Journal of Enterprise Technologies, 4/8*(76), 54-59.

Rothwell, R., & Gardiner, P. (1985). Invention, innovation, re-innovation and the role of the user: A case study of British hovercraft development. *Technovation, 3*(3), 167-186.

Sait konsaltingovoi firmi KPMG [Site of consulting firm KPMG]. Retrieved from https://home.kpmg.com/xx/en/home/industries/transport-logistics.html

Schumpeter, Y. (2008). *The theory of economic development.* Moscow: EKSMO.

Tetiana, H., Karpenko, M.L., Olesia, F.V., Yu, S.I., & Svetlana, D. (2018a). Innovative methods of performance evaluation of energy efficiency project. *Academy of Strategic Management Journal, 17*(2), 1-10.

Tetiana, H., Karpenko, L.M., Olesia, F.V., Yu, S.I., & Svetlana, D. (2018b). Innovative model of enterprises personnel incentives evaluation. *Academy of Strategic Management Journal, 17*(3), 1-6.

Tuyen, T.N. (2010). Knowledge economy and sustainable economic development: A critical review. Retrieved from http://www.e-cademic. de/data/ebooks/extracts/9783598251818.pdf.