

Olga Maslak

Doctor of Science (Economics), Professor,
Kremenchuk Mykhailo Ostrohradskyi National University,
Head of Economics Department
Kremenchuk, Ukraine
olga-bezruchko@mail.ru

Oksana Zbyrannyk

Kremenchuk Mykhailo Ostrohradskyi National University,
PhD Student at Economics Department
Kremenchuk, Ukraine
zbyrannykoksana@gmail.com

**DEVELOPING COMPETITIVENESS OF ENGINEERING
ENTERPRISE INFLUENCED BY INNOVATION PRODUCT
FACTOR**

Abstract. The article deals with determining the main factors of the possibility of creating innovation product of Ukrainian engineering enterprises. The authors describe the stages of managing the process of establishing prospects of the innovation product creation, analyse the volumes of attracting capital investments of Ukrainian enterprises as an opportunity to modernize the national economy on this basis, consider interconnect between innovation product enhancing and the enterprise competitiveness level that can influence the realization of innovative potential of the enterprise, the implementation of advanced approaches to the manufacturing organization, product innovation and technology progressiveness, the development of competitiveness advantages, the total level of the enterprise competitiveness.

The research determines the category of innovation product and studies the influence of the product innovation on the level of engineering enterprise competitiveness. The article suggests establishing the versatility indicator of the enterprise product innovation that allows revealing the level of its ability to compete with competitors' products successfully.

Keywords: innovation product, enterprise innovation activity, engineering enterprise competitiveness, competitiveness advantages, versatility indicator of the enterprise product innovation

Formulas: 1, fig.: 2, tabl.: 3, bibl.: 10

JEL Classification: D41, L52, L60

Introduction. Enhancing competitiveness on all levels is an extremely important task for any world country including Ukraine. First of all, it is connected with competitiveness being the main characteristic required from any economic subject regardless of its national or international functioning level. It is worth stating that innovations are the basis of forming engineering enterprise competitiveness in the conditions of globalisation and constant competitiveness intensification.

Taking into consideration that manufacturing engineering production differs by a long production run, the category of the product innovation as a factor of receiving additional competitiveness advantages should be determined as having a particular meaning for receiving additional competitiveness advantages.

Neglecting the innovation requirements threatens the engineering product enterprise with a very fast loss of a significant number of clients since the speeded-up development of the modern element basis of utility and a wide range of various materials together with an unprecedented IT development provide more mobile competitors a significant advantage in the market penetration.

Research analysis and problem statement. It is impossible to overestimate the importance of innovative development for engineering enterprises. The economic growth in this sector can be achieved due to innovation products only. Consideration of the innovation development as a main factor of forming competitiveness finds its reflection in the fundamental researches by foreign and domestic scientists, such as R. Ackoff [Ackoff, Russell 1984], P. Drucker [Drucker, Peter 1992], M. Porter [Porter, Michael 1998], B. Santo [Santo, B 1990], B. Tviss [Tviss, B 1989], O. Amosh, Y. Bazhal, A. Halchynskiy, V. Heiets, V. Illiashenko, M. Krupka, I. Lukinov, M. Tuhanyan-Baranovskiy.

In their researches, the domestic scientists make an emphasis on the peculiarities of the Ukrainian enterprise innovation development connected with opportunities to improve the whole enterprise economic potential and the state economy in the whole.

Although they do not pay enough attention to the study of the innovation product category determined by the share on the market the enterprise holds, the volumes of manufacturing the knowledge-based products, the enterprise potential and its innovation constituent, the level of innovation activity, etc.

That is why the research determines the category of innovation product and studies the influence of the product innovation on the level of engineering enterprise competitiveness.

Research results. Creating the competitive manufacturing of the highly technological products should be based on the innovation model of competitiveness, competitiveness increase on the enterprise level, shifting advantages on the quality and innovation of the products and not on the manufacturing expenses. The low rate of research and development, ineffective management system, the low level of the employee's qualification [Boiarynova 2014].

Using innovation ideas, knowledge, information technologies is a source of competitiveness advantages. Informatization envisaging the development of computer and telecommunication opportunities of increasing the employee's intellectual capital plays an important part in these processes. It is the reason for considering informatization as a global innovation process used by enterprises as a basis for developing the strategy of their social-economic growth [Kolodiychuk, 2011]. Hereby the informatization should be based on the process of spreading knowledge – innovations and their diffusions – in the scientific-technical sphere of the enterprise employee's activity. Such approach secures competitiveness of the engineering enterprises on the principles of innovation development. Success of the industrial enterprise innovation development should be based on the usage of the main factors listed and characterized in the Table 1.

Taking into account the totality of factors allows securing high quality of the new products, comparatively low expenses on their manufacture, ability to accept timely the management decisions caused by the changes in the internal and external environment with the use of information systems and up-to-date computer technologies, etc.

Table 1 – The main factors of the possibility of creating an innovation product of Ukrainian engineering enterprises

Factors	Characteristics
Organizational	Availability of the big experience in creating innovations, ability to accept quickly the management decisions caused by the changes of the external environment, availability of the efficient information systems
Technological	Possibility of using innovation technologies in the manufacturing process, opportunity to development new products
Common	Optimal expenses for the enterprise on conducting R&D, availability of patents, access to the markets of innovation products and financial markets
Manufacturing	Availability of the highly qualified scientific-technical staff, opportunity to increase the employees' qualification, comparatively low cost of manufacturing innovation products
Professional	Ability to adopt a new product, application of now-how in the process of creating innovation products.

Source: Developed by the authors on the basis [Kolodiychuk, 2011]

Overcoming unfavourable tendencies of social-economic development of our country is suppressed by the backwardness of the technological structure of the industrial manufacture, the low rate of the manufacturing basis, the weak state financing of R&D. Despite determining priority directions of the innovation development in Ukraine, applying the mechanism of differentiated reduced taxation of the enterprises depending on the level of their innovation activity, stimulation of R&D, increasing significantly the salary of scientific employees, creating information data basis concerning innovation technologies, the regress of the technological backwardness of domestic enterprises is aggravating that does not favour leaving the crisis state of the innovation sphere of Ukraine, creating real conditions for transferring economy into the innovation development model.

Besides, overcoming the technological backwardness of the domestic industry depends on the foreign investments, thus, securing the favourable investment climate in Ukraine is the issue of strategic importance since the social-economic dynamics, efficiency of being attracted into the world labour division, opportunities of modernizing the national economy on this basis depend on its realization. The volumes of attracting capital investments of Ukrainian enterprises in January–July 2015 are 98.7 billion UAH that is 90.8 % of the corresponding period of 2014 (Fig. 1).

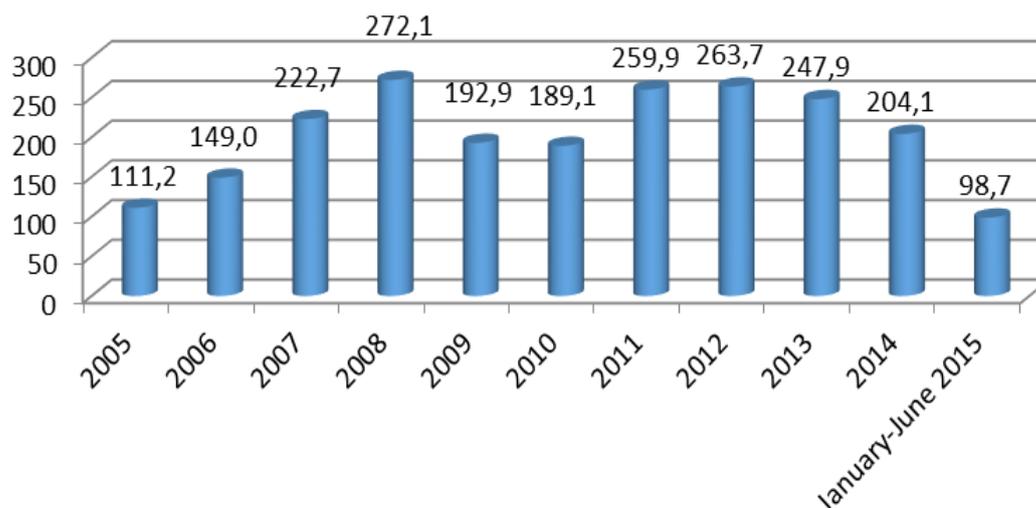


Figure 1 – Volumes of attracting capital investments of Ukrainian enterprises (billions UAH)

Source: Developed by the authors on the basis [Statistic information]

31.5 % of the total volumes of direct investments into Ukraine are concentrated in the industrial enterprises, 25.9 % – in the financial and insurance establishments.

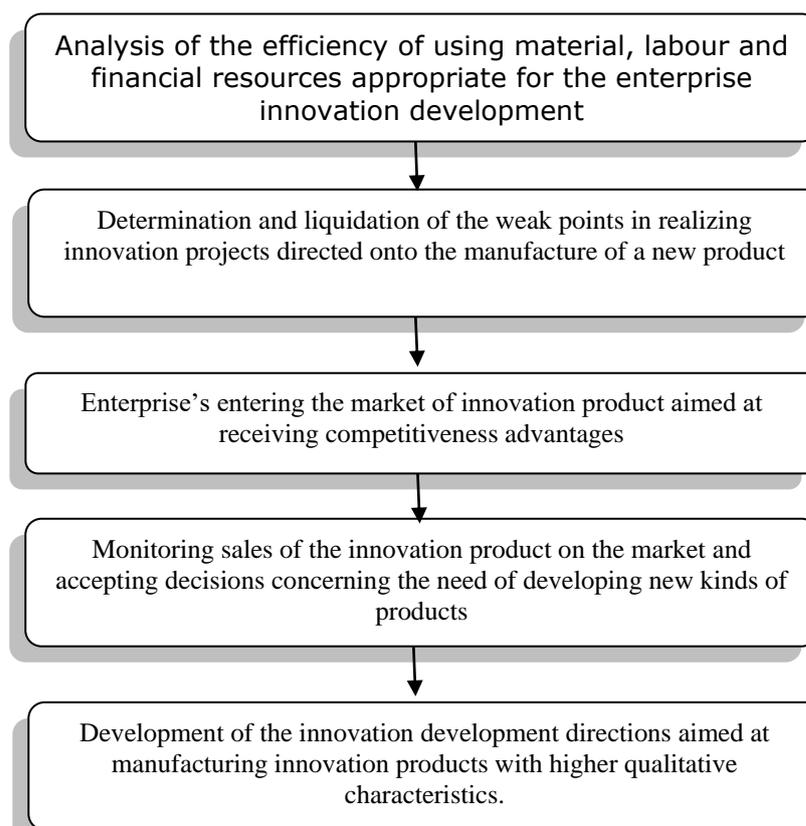


Figure 2 – The stages of managing the process of establishing prospects of the innovation product creation

Source: Developed by the authors on the basis [Kolodiychuk, 2011]

Industry – 33.7 billion UAH, building – 15.0 billion UAH, information and telecommunications – 14.5 billion UAH, agriculture, forestry and fishery – 9.4

billion UAH, wholesale and retail trade, repair of the transport vehicles and motorcycles – 7.6 billion UAH, transportation, warehousing, post and courier services – 6.0 billion UAH, operations with mortgage – 3.8 billion UAH Remain the leading fields of the economic activity according to the volumes of attracted investments in January–June 2015.

The enterprises and organizations' own assets remain the main source of financing capital investments as earlier. 69.3 % of the capital investments were developed in January–June 2015 due to them.

The innovation activity of enterprises is suppressed by the lack of own assets, lack of measures concerning the state support of domestic manufacturers. It requires the enterprises to develop the stages of managing the process of determining prospects of creating innovation product that have to be based on their certain list given in Fig. 2.

The main attention is paid to the active promotion of the product and search for new sales markets appropriate for increasing the engineering enterprise competitiveness [Kalna 2015].

Supporting innovation development on the rail carriage building works in Ukraine has a prior importance in such conditions, since it favours securing modernization and enhancing the state economy competitiveness in the whole.

Nowadays there are 6 rail carriage building works (without taking into consideration the railway carriage repair works) in Ukraine (in Kremenchuk, Mariupol, Kryvyi Rih, Stakhanov, Poltava) and two locomotive building works (without taking into consideration the locomotive repair works) in Luhansk and Dnipropetrovsk (Table 2) [Zbyrannyk 2015].

Table 2 – Characteristics of the main kinds of products of the enterprises manufacturing the railway rolling stock

Enterprise 1	Main kinds of products 2
1. Public Corporation "Kriukiv rail carriage building works"	Freight car building: gondola cars, hopper cars, bunker cars, flat cars, covered goods wagons, all-purpose platforms, composite carriages, wagons, wheel pairs, a wide range of spare parts and utility for freight rail carriages).
	Passenger rail carriage building: couchette cars, corridor coaches, sleeping cars, cars for people with special needs, dining cars, cars for international freight transportation RIC, InterCity cars, InterCity+ cars, 48 models and modifications of passenger cars, 29 models and modifications of running gears for them.
	Products for subways: subway cars, wagons, wheel pairs, subway wagon frames, spare parts; escalators (floor, tunnel).
2. Public Corporation "Stakhaniv rail carriage building works"	Freight car building: hopper cars, open wagon, covered goods wagons, tank cars, platforms, transporters, dump cars, flatcars, bunker type cars

End of **Table 2**

1	2
3. Public Corporation "Dnipropetrovsk rail carriage building works"	Freight car building: More than 150 models of cars of practically all types: Open wagons, covered hopper cars and covered flatcars for various freights, dump cars, specialized technological transport means.
4. Public Corporation "Azov rail carriage building works"	Freight car building: Specialized, oil-petrol and gas tank cars for transporting light and ductile oil products, liquefied gases, ammonia; – open wagons for transporting coal, ores, broken stones and other dry materials.
5. Public Corporation "Poltava chemical rail carriage building works"	It is specialized in manufacturing tank cars for transporting liquid hydrocarbon gases, propane, and butane. The whole model range consists of 7 models of the rail freight main-line cars
6. Public Corporation "Diesel works"	Manufacture of the rail rolling stock; assembly of machines for the mining extractive industry and building; technical maintenance of motor vehicles.

Source: compiled by the authors on the basis [Stock market infrastructure development agency of Ukraine (SMIDA)].

Interconnection between the product innovation increase and the enterprise competitiveness level can influence:

- the realization of the enterprise innovation potential;
- the application of advanced approached to the manufacture organization;
- the product innovation and technology progressiveness;
- the competitiveness advantage development;
- the total level of the enterprise competitiveness.

There are two ways of increasing the product competitiveness: decreasing price and increasing quality. The price constituent is almost exhausted, so the enterprise can operate effectively only in the conditions of the constant improvement of technical, economic, ergonomic, marketing indicators of the manufactured products. The application of innovation projects, transition to the innovation development of the industry in the whole is the only way to solve this task [Haiduk 2014].

Developing, applying and spreading new products, services, technological processes, their innovation become the key factors of increasing the volumes of manufacture, population employment, investments, external trade turnover, improving the product quality, saving labour and material loses, improving manufacture organization and enhancing its efficiency. It causes competitiveness of the enterprises and the products manufactured by them on the domestic and international markets, improves social-economic situation [Zagorodnyi, Chubai 2009]. The product versatility indicator for the enterprise in comparison to the product of a certain competitor is determined according to the suggested formula (1):

$$I_{pr}^{fk} = (Kq_f^1 * k_1 + Kc_f^1 * k_2 + Ks_f^1 * k_3) : (Kq_f^k * k_1 + Kc_f^k * k_2 + Ks_f^k * k_3), \quad (1)$$

where

Kq_j^1, Kq_j^2, Kq_j^K is the level of a certain kind of product of a certain enterprise and its certain competitor;

Kc_j^1, Kc_j^2, Kc_j^K is the level of the client's expenses for buying and exploiting a certain kind of product of a certain enterprise and its certain competitor;

Ks_j^1, Ks_j^2, Ks_j^K is the level of the science absorbing of a certain kind of product of a certain enterprise and its certain competitor;

k_1, k_2, k_3 are coefficients reflecting the significance of indicators;

$Kq_j^1, Kq_j^2, Kc_j^1, Kc_j^2, Ks_j^1, Ks_j^2$ – for certain market segments (coefficients are determined on the basis of marketing research).

K is a certain competitor of the enterprise. The closer is the level of quality, level of the customer's expenses on buying and exploiting, level of science absorbing to the unity, the closer is the analysed product to optimum at this moment according to a certain group of indicators. If the level of one of the three components of the innovation product competitiveness equals "1", it means that the enterprise's product is the best according to this component.

The versatility indicator of the enterprise product innovation allows revealing the level of its ability to compete with competitors' products successfully. If $I_{pr}^{fk} < 1$, the product of the enterprise is less competitive according to the innovation level than the competitor's product, if $I_{pr}^{fk} > 1$ – more competitive and if $I_{pr}^{fk} = 1$ – the product of the enterprise is of the same competitiveness as the competitor's product (Table 3).

Studying the market situation and the customer survey allows determining the ratio of the enterprise's share on the market and the level of the product innovation.

Table 3 – The Structure of the freight engineering market division and the assessment of the competitors' innovation product among the CIS works:

Enterprise	Enterprise's share on the market / Innovation product versatility indicator				
	2011	2012	2013	2014	2015
Public Corporation "Azov rail carriage building works"	31.31/1.0	33.25/1.1	27.57/0.94	13.14/0.54	13.07/0.54
Public Corporation "Kriukiv rail carriage building works"	12.17/0.52	12.03/0.52	12.01/0.52	48.25/1.1	47.85/1.0
Public Corporation "Dnipropetrovsk rail carriage building works"	14.45/0.56	13.23/0.54	12.77/0.54	13.56/0.55	13.23/0.54
Public Corporation "Stakhaniv rail carriage building works"	13.94/0.55	12.44/0.53	13.19/0.54	12.44/0.53	–
Public Corporation "Poltava chemical rail carriage building works"	4.26/0.21	8.51/0.42	7.95/0.39	5.31/0.25	6.02/0.26
Public Corporation "Diesel works"	3.60/0.19	1.83/0.08	1.81/0.08	–	–
Other CIS enterprises	18.33	20.65	24.70	7.30	12.83
Total:	100.00%	100.00%	100.00%	100.00%	100.00%

Source: compiled by the authors

Thus, the data given in the Table proves the product innovation, i.e. its ability to create competitiveness advantages of this product's customers due to

its own competitiveness advantages, that is a significant factor of increasing the presence of such products on the market with enhancing the enterprise's market share on the market hereby in the whole.

The corresponding dynamics of the market share in combination with the product innovation versatility indicator on the enterprises Public Corporation "Azov rail carriage building works" in 2012 and Public Corporation "Kriukiv rail carriage building works" in 2014 proves this conclusion.

Conclusions. Taking into consideration that manufacturing engineering production differs by a long production run, the product innovation as a factor of receiving additional competitiveness advantages should be determined as having a particular meaning for receiving additional competitiveness advantages. Product innovation is determined as a qualitative characteristic, ability to adopt both scientific and technical novelty and market demand that can be objectively assessed by the customer when widening opportunities for the use and for the application of technical and technological innovations, widening characteristics of the end product hereby. It requires the development of the modern competitive environment, operating financial-banking system, conducting the real state support and organizing the innovation and investment processes.

References

- Ackoff, R. (1984). *Revitalizing Western Economies*. Stanford University Press: Stanford, CA, 376 p.
- Baiarynova, K. O. (2014). Foreign experience of the use of innovation oriented methods for securing competitiveness of engineering enterprises. *Economy and management organization*, № 3 (19), p. 30-37.
- Drucker, P. (1992). *Management Challenges for the 21st Century*. Pitman Publishing: Harper Business, 672 p.
- Haiduk, L. A. (2014). Innovations as a factor of securing competitiveness of Ukrainian enterprises // *Scientific works of the Scientific and Research Financial Institute*, № 1 (66), p. 22-28
- Kalna, T. A. (2015). Competitiveness of the products of engineering industry. *Economic analysis*, № 21 (2), p. 93-99.
- Kolodiychuk, A. V. (2011). Methodological approach to proving the innovation model of the industry development // *Scientific notes of Lviv University of Business and Law*, №7, p. 182-186.
- Porter, M. (1998). *Competitive Strategy: Techniques for Analysing Industries and Competitors*. Pitman Publishing: Free Press, 397 p.
- The State Statistic Service of Ukraine: Statistic information* / The State Statistic Service of Ukraine. Retrieved from <http://www.ukrstat.gov.ua>.
- Zahorodnii, A. H., & Chubai, V. M. *Strategic analysis of the innovation product competitiveness*. Retrieved from www.nbu.gov.ua/old_jrn/natural/Vnulp/.../2009.../10.pdf.
- Zbyrannyk, O. M. (2014). Innovation activity of the engineering enterprises of Kremenchuk region [Text]. *Analytical centre "New Economy"*, p. 32-35.

*Data przesłania artykułu do Redakcji: 28.10.2016
Data akceptacji artykułu przez Redakcję: 31.10.2016*