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Peter Bago,
PhD, Assistant Professor,
Corvinus University of Budapest, Hungary
ORCID: https://orcid.org/0000-0002-6929-8437

FORMATION OF THE INFRASTRUCTURE OF THE GLOBAL INNOVATION MARKET

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Abstract. *Emergence of the global technology market is under the influence of transnationalization in the context of informatization of the knowledge economy in parallel with the formation of the global market for intellectual property products, which together with the institute of private property will determine the conditions for the generation and implementation of new ideas. The role of the patent system in the international technological exchange in the global harmonization of both direct and indirect regulation of innovation is increasing. The prospects for the global technology market will determine the processes of digitization and automation of the standardized industries and services based on the artificial intelligence, energy efficiency using renewable sources, greening and socialization, especially in pharmacy and medicine. The most common is the business model when demand finds a suitable offer among users rather than commercial agents through an online platform. Since one of the main problems is lack of complete trust in online operations, platforms are working to improve the financial and personal security of their users and the virtual identification of customers.*

Keywords: *sharing economy, business model, innovative development, TNC, startup.*

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Introduction

Economic growth as a result of technological advances is case of increasing population is able to meet its ever-growing needs in the conditions of the depletion of traditional resources. The beginning of the 21st century was marked by the fundamental transformation processes and the formation of a post-neoliberal model of global economic development, when competitiveness and progress are increasingly determined by digitization, intellectualization, creativity, energy efficiency and environmental responsibility, social responsibility and security. Assessment of these trends becomes the scientific basis for the development of prognostic scenarios for the development of economic systems at different levels.

Technological innovation is a key imperative for economic and social progress in today's global economy, substantiated by economic theory and validated by the practices of the leading countries.

Economic transformations, caused by scientific and technological progress and spread primarily by transnational corporations, led to the formation of a global economy, an appropriate global research, production, logistics and financial infrastructure on the basis of the abrupt increase of the scale, quality, popularity and accessibility of information and communication technologies in all spheres of

international economic relations with the unification of regulatory rules and regulations at the beginning of the 21st century. The global economy is beginning to be divided not into separate national and regional economic systems but into interconnected sectors, clusters and networks, structuring the world into a multi-level, complex, contradictory system with global imbalances and symmetries.

The purpose of the study is to study key principles and conditions, to identify mechanisms and models of the relationship between innovation and technological factors and global economic progress.

Literature Review

More and more countries are becoming dependent on emerging technology leaders as they couldn't form a competitive information technology sector as part of the national economy. Some scholars (Beck, 2018) call this status of affairs as information and echnological neo-colonialism.

The main instrument of colonization is the intellectual property right by which countries with monopoly rights to technical inventions protect their position from the rest of the world (Beckert, J., & Dewey, M. (Eds.) (2017)). The areas most affected by globalization processes are the financial system and media.

When production links go beyond national boundaries, transnational associations emerge, governed by specific supranational regulatory and management bodies, which have, as a result, become the main engines of globalization in its current sense (Coulibaly, S.K., Erbao, C., & Mekongcho, T.M. (2018)).

When more than half of the world's industrial production and international trade flows came under the control of TNCs, a new class of TNCs, such as multicultural global corporations, emerged (Drahos, P., & Braithwaite, J. (2017)). They are interested in the enclave economic development of most countries in the world, which exacerbates regressive structural shifts in the national economy of these countries. TNCs are only created by enterprises that are competitive by international standards, the number of them is small in most countries of the world.

In addition, new supranational structures, such as the IMF, the WB, and others, are being created to regulate new global social processes.

Given the globalization of economic activity, in order to achieve competitiveness in the global market, the national production begins to obey not only internal rules and regulations, but also international, unified ones.

On the one hand, national manufacturers have no other path of development: if products and ways of doing business do not meet generally accepted international standards, localization within national boundaries is not successful with the advent of TNC markets offering the best product or service (Feiock, R.C., Moon, M.J., & Park, H.J. (2017). Thus, intra-national production processes become a part of a single planetary production and logistics chain. The global economy does not begin to divide itself into separate national economic systems, but integrates them into separate sectors, regions and clusters, qualitatively re-structuring the world into a more complex networked economic system.

On the other hand, firms producing and selling their products on a global scale are forced to develop local connections, as well as to obtain the necessary resource

for their global symbols from local cultures, for their vitality, brightness, market attractiveness (Gözgör, G., & Can, M. (2017)).

In addition, acquiring specific features inherent in them, based on both starting conditions and specific intentions, integration associations are transformed into a means of comparing and co-existing interests at the global level, and the institutional and legal links between them create the preconditions for forming a new balance of power , a new global, system of international economic relations (Griffin, K. (2018)).

Modern information and communication technologies allow international clusters to expand their territory, number of members, and role in the global economy, becoming intellectual centers of attraction for human and creative capital (Jamali, D., Karam, C., & Blowfield, M. (2017)).

In this case, institutional investors become a link for states, corporations and international organizations, enabling them to reconcile their goals and conduct economic cooperation for mutual benefit. Active marketing strategies that have been tailored to the economic, political, social and cultural situation have created new influential actors in economic globalization - city leaders.

The largest metropolitan areas have transcended the cultural and social boundaries of their states, turning into the places of attraction for innovative individuals seeking to get comfortable infrastructure and become a part of the "ideological field" through interaction with an increasing number of highly skilled city dwellers (Li, L., Li, L., Liu, L., Long, H., de Jong, W., & Youn, Y.C. (2017). In addition, social networks, the Internet, and virtualization have reduced the barrier of entry into the structure of economic globalization, so in addition to large institutions such as corporations and states, individuals have acquired the status of one of the most influential actors in international economic relations. Virtualization allows practically everyone to spread their ideas around the globalized world and gain so many adherents to influence the decisions of states, TNCs and international organizations. In our view, the next step in the evolution of the structure of economic globalization actors should be the empowerment of individuals to create and adopt binding international law standards at the level with other institutional actors.

In general, an analysis of the existing paradigms of economic globalization demonstrates that there is no single concept among scientists: some scholars argue that only economic interests and contradictions are the basis of globalization and future global conflicts, while others emphasize the differences of cultures and the division of the world into competing civilizations (Rodrik, 2018). There are optimistic predictions and scenarios for the development of a globalized world as all nations, cultures and economies thrive, share ideas and work together to solve global problems for humanity.

Pessimists insist on the need to halt the globalization process because it will result in the exploitation of a small number of monopoly countries of the rest of the world (Scheuerman, 2017).

Most theories are considered globalization as an objective process that must be taken into account by governments and society when planning their own development (Sheth, 2017).

Contemporary contradictory trends in the global economy shape new processes of fragmentation (formation and strengthening of blocs and alliances of "nation states" in the form of complex hierarchical systems against the background of increasing number of "actors" on the world stage with a further change in the balance of their forces) (Steger, 2017) and globalization (a process of restratification of the world based on new principles that makes it possible to create a new hierarchy on a global scale) (Stiglitz, 2017). Fragmentation and globalization form the newest phenomenon of independence.

Independence demonstrates the latest paradox (Tsukada, 2017), when none of the states is able to take responsibility for ensuring the public goods necessary for orderly functioning and maintaining stability of the global economy and for exercising effective control over the internationally-mandated institutions forced to maintain the openness of the trading system, to save the stability of the monetary system, and ensure the proper functioning of the world financial markets.

However, despite the increasing number of scientific publications on the impact of innovation on the development of economic systems, further research is needed to systematically understand their new role in global economic progress, which requires scientific exploration in the categorical, classification and statistical fields. Important in theoretical and practical terms is a comprehensive study of the conditions, factors and features of global intellectualization. It led to the choice of the topic of the paper, logic.

Methods

The working hypotheses of the research are based on the combination of dialectical principles of scientific cognition with general scientific and special methods of research according to the logic of the paper: induction and deduction; abstraction, analysis and synthesis; statistical quantitative and qualitative comparisons and analogies; historical and logical; scenario forecasting (in the construction and justification of forecasting models of global economic progress); expert assessments; economic and mathematical (in the process of evaluating the business models of the economy).

Results

The most comprehensive information on innovation in almost all countries is provided by the Global Innovation Index, which is compiled annually by the World Intellectual Property Organization. An analysis of recent reports allows us to draw the following conclusions. First, there is a clear correlation between the level of development of a country and its level of innovation. The key advices provided by international organizations for promoting development in developing countries are often the need to stimulate and develop innovative sectors of the economy. However, in our view, comparing developed and developing countries at some specific point in time and claiming that the latter are lagging behind due to a lack of innovation input to total GDP is not correct. In fact, the leading innovator countries have undergone a long process of establishing, promoting, protecting and commercializing their own innovative developments. They entered into every new technological venture with

significant financial resources, which allowed them to significantly break away from competitors and to build up their capital. In addition, high-income countries had the opportunity to invest in development of their own human capital. The third world countries are not able to accumulate the necessary investment to develop the full range of innovation, so they always have a choice: what innovative areas to support with state aid to stimulate their development.

However, countries from different groups, such as high- and middle-income countries, often have comparative innovation inputs, but weaker countries lag behind in terms of creativity, intellectual and technological gains. This situation testifies to the importance not only of quantitative indicators, but also of the qualitative component of innovation activity - the quality of national university education, not simply the total number of higher education institutions in the country and the number of persons who have received higher education, the level of internationalization of national inventions, not the total number patents and registered utility models issued, the number of international references to national scientists, not the total number of scientific publications. At the same time, the best results in innovation activity are achieved by countries which not only create the conditions for the development of human capital and form the necessary institutions, but also have effective mechanisms for commercialization of innovations.

In addition, it should be noted that there is a time lag between improving innovative inputs and further benefiting from an innovative sector becoming dynamically to be developed. For example, investment in human capital involves the development of specialized early childhood programs, continuing with school and university programs, and can cover all stages of human development. The return from such investments will only be possible after the next generation has entered into an active economic life (at least twenty years). Investments in infrastructure and institutions produce a time lag of about from two to five years. Probably, only the conditions of doing business can directly and quickly influence the innovation and business activity in the country. Thus, countries started investing in human capital, institutions, infrastructure at least at the end of the XXth century are now benefiting from higher innovation outputs and can be credited to leading innovator countries.

A new idea, a scientific proposal appearing on the market in the form of an intellectual property object, is not always clear to businessmen, investors, manufacturers and does not give a full guarantee of the possibility of its practical implementation and profit from its implementation. It is necessary a link between science and manufacturers, which is able to transform scientific ideas into a real innovation project, in order to be able to create ready-made innovative products, new goods and services. Information about the innovation in economic activity is recorded in the form of a special certificate or patent, which secures the author of the idea's ownership on the idea. Innovation as a product arises at this moment. Innovation as a product emerges as the ownership of a new idea. Therefore, innovation as a product must be unique, with virtually no analogues, because according to the definition, a patent or certificate marks the difference of this new idea from others already expressed by someone. The owner of the ownership of the innovative idea is a

monopolist in the innovation market, since no one else has the right to sell the idea as a product.

The main condition and component of effective innovation activity is a competitive infrastructure of the innovation market, its qualitative development level determines the duration of the innovation process, forms a priority portfolio of innovations, contributes to achieving the desired results of innovation activities.

Among the elements of the infrastructure of the innovation market are: trade networks, telecommunications networks, techno poles, techno parks, business incubators, innovation and technology centers, financial structures, consulting firms. The main task of the infrastructure of the innovation market is to ensure interaction and dissemination of information between the subjects of innovation activity, to facilitate the establishment of effective and mutually beneficial links between different institutional institutes.

As a system the innovation market includes: information, instrumental and financial support of operations, therefore, the appropriate specialized institutions, organizations and institutions operates to execute the above tasks in the innovation market, each of them performs the respective functions. In this sense, innovation infrastructure is a set of political, economic, legal, managerial, financial, information, scientific and other institutions of the innovation market that create the conditions for effective implementation of innovation activities.

An effective mechanism for the functioning of the innovation market infrastructure must meet such requirements as: high scientific and technical potential of the subjects of the innovation market; full integration of the infrastructure component of the innovation market with financial and credit support; availability of a developed information support system; high flexibility and adaptability; versatility, allowing to solve the problem of innovation implementation in any field of production or service sector of the economy; professionalism based on quality customer service - subjects of innovative activity; complete innovation market infrastructure with the purpose to achieve timely and effective results of innovation activities; formation of mechanisms of accumulation innovative experience. The most widespread activities of various support structures of innovative entrepreneurship are presented in Fig. 1.

It should be noted that techno parks previously occupied a special place among the objects of the innovation market infrastructure, ensuring a close territorial rapprochement between the necessary industrial research material base and the human component of the country's scientific potential. Techno park brings together scientists, industrialists and capital at one geographical point, which allows to intensify the innovation process and make the development and implementation of innovative products and processes more efficient. A successful techno park makes a complex of such elements as the sufficient level of funding; access to qualified business, advisory and management services; availability of technical support companies; participation in the work of a techno park of highly qualified specialists who cooperate on a permanent basis; an atmosphere of trust and invention.

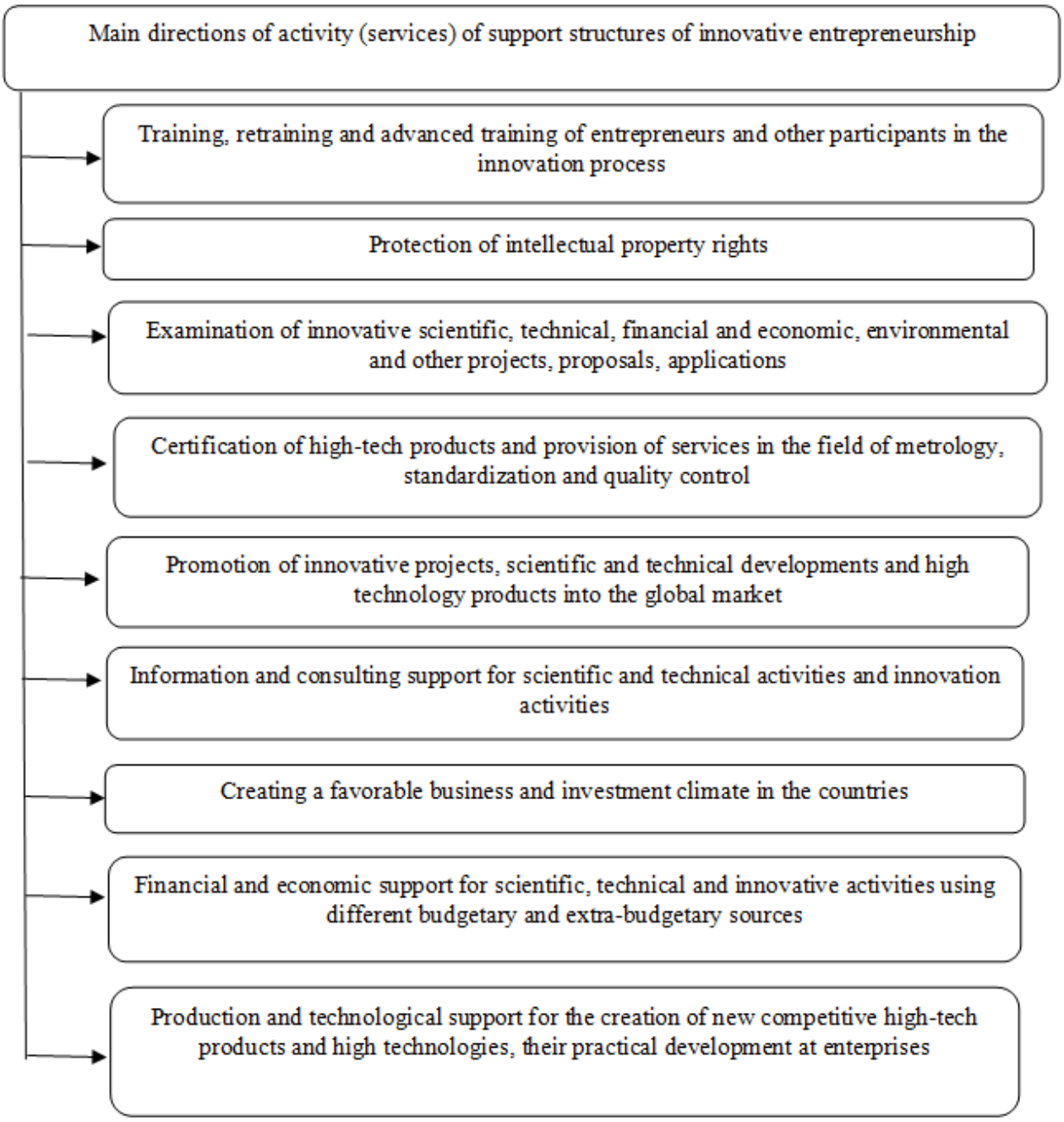

Figure 1. Main directions of structures activity supporting innovative entrepreneurship
(author's development)

It should be noted that techno parks previously occupied a special place among the objects of the innovation market infrastructure, ensuring a close territorial rapprochement between the necessary industrial research material base and the human component of the country's scientific potential. Techno park brings together scientists, industrialists and capital at one geographical point, which allows to intensify the innovation process and make the development and implementation of innovative products and processes more efficient. A successful techno park makes a complex of such elements as the sufficient level of funding; access to qualified business, advisory and management services; availability of technical support companies; participation in the work of a techno park of highly qualified specialists who cooperate on a permanent basis; an atmosphere of trust and invention.

The factor of physical proximity loses its weight and importance in the context of the globalization of markets and rapid development of information and communication technologies (ICT). It is not necessary at this time to physically be at the epicenter of the world information technologies in order to create an innovative product or a successful startup. All the necessary information can be found on the network, to present your project to potential investors there. To get financing and then to choose a convenient place for further development. Young entrepreneurs from developing countries most often choice this way. Entrepreneurs pay more attention to the comfort and convenience of their home than to proximity to investors or other innovators in the context of global information networks. Therefore, techno parks are beginning to lose their advantages in organizing innovative activities. Their future depends on their ability to create a unique atmosphere of innovation and to provide effective personal communication between innovators, investors and service personnel.

The technological elements of the state's innovation system are also techno poles. Their structure and functions are similar to techno parks, but they are differed mainly due to they include a small settlement. Organizationally, a network of structural entities of the techno polis-type is a set of three basic structural components: a scientific core consisting of universities, research and scientific-technical organizations; industrial zone, which implies the creation and development of industrial potential; residential area (residential buildings and objects of socio-cultural purpose). This structure of the techno polis is a manifestation of the highest level of integration of science and urbanization. Therefore, techno poles are more competitive in today's ICT domination, as they provide an opportunity to combine creative scientific work and a comfortable permanent residence, thereby creating a unique creative atmosphere.

Significant effectiveness in creating a favorable financial, organizational, scientific and industrial environment is demonstrated by such elements of infrastructure as incubators. Their main purpose is to support young entrepreneurs starting their businesses in high-tech, and therefore risky industries, consulting services, project expertise, assistance in attracting public funding, and providing administrative services.

As a rule, innovation activity is not distributed evenly across the territory of the state, but concentrated in clusters that are tied to one or more neighboring cities, and the locally concentrated innovation hubs becomes an engine of innovation activity bringing the entire national economy to higher levels of innovation development. Contemporary there is not commonly accepted definition and criteria for an innovation cluster, as well as a clear list of their ranking. In addition, the geographical boundaries of innovation clusters generally do not correspond to the formal territorial division of the country, according to it governments collect statistical information. The study of the functioning of innovation clusters at the subnational and international levels has become relevant because, combining talents, know-how, research laboratories and production capabilities, often going beyond national economies, forming global innovation centers which begin to affect all local economy.

Modern ICTs allow humanity to reach a new level of interaction. You may be a small business owner, but you are able to reap the benefits by interacting with other individuals through a global network. Previously it was available only to large corporations. Currently, everyone is able to bring together an unlimited number of partners and potential clients with an interesting and promising idea. It requires a desire and a certain level of ICT skills that anyone can gain from free online courses. Most often, the competitive strategy of small companies is the rapid implementation of the idea and the rapid entry into the market with an innovative product or service, which creates some competitive advantage over large companies, which make a long and bureaucratic decision-making process.

In general, 3D printing, efficient use of sustainable production resources and robotics are powerful drivers of employment growth in the field of architecture and engineering, experiencing an ever-growing need for skilled professionals to create and manage innovative and automated production systems. Manufacturing is expected will turn into a highly scientific process where highly qualified engineers will implement projects aimed at making the internet of things to reality.

Cash flow automation and smart inventory using sensors and other devices of the internet of things are factors in reducing demand for traditional jobs in trading sphere. On the other hand, employment growth in the sector may be driven by the use of big data analytics to optimize and personalize sales.

The largest decline in employment is expected among office and administrative workers through the mobile Internet, cloud technologies, big data analysts, the internet of things. The relatively small impact on employment is expected from the two most publicized results of the technological revolution. Yes, artificial intelligence and machines able to learn on their own will lead to a decrease in employment in such areas as training, law, business, finance.

Therefore, the effect of job creation in the context of the Fourth Industrial Revolution is expected to be disproportionately smaller than the number of laid-off low-skilled workers. In addition, even highly-skilled workers will need constant training and new knowledge.

For this reason, the entry of the labor market into a new era of technological fluctuations with increasing wage inequality is forecasted. In addition, there is a growing demand for specific new professions that emerge during introduction of new technologies into the economic life, such as: data analysts who need to generate new ideas for business, using growing information flows; specialized sales representatives, as practitioners of virtually every industry will need to become proficient in commercializing their own products and promoting their offerings to business, government customers, consumers, explaining to them innovative product specifications or seeking new customers with who the company is not yet familiar; human resources development specialists; engineers who will work with new materials, biochemicals, nanomaterials; robotics; specialists in work with state and regulatory bodies; experts in geospatial information systems; industrial designers; top executives who will successfully manage the company in the turbulence and destruction of traditional business schemes.

In the light of emerging trends in the labor market, global corporate management is increasingly focusing on the development and training of new and existing workforce skills. As a consequence, the number of public-private partnership programs in the field of education, training and retraining of skilled personnel is growing significantly. In this way, corporations meet both their own needs and help to solve social problems. Therefore, the vision and management of the human resources of corporations undergoes significant changes, namely:

- Human resource development: business leaders take an active stance on adapting to the new situation in the job market, highlighting innovative tools of talent management.
- Using accessible analytics: companies need to build a new approach to workforce planning and talent management based on better data forecasting and planning.
- Talent diversity as a priority: as companies will face a shortage of workforce in 2020, it is time to make dramatic changes to the search for talent when the barriers on gender, age, and ethnicity should be overcome.
- Use of flexible working mechanisms and social networks. Contemporary, work is what people do, not where they work. This is why innovative forms of associations such as online freelancer unions are emerging and updated labor market regulation rules are being introduced to complement new models of workforce organization.
- Cross-sectoral and public-private collaboration: given the complexity of the challenges facing global corporate management, it is necessary for business to understand that talent support has turned from a simply nice bonus into a necessary component of a corporate strategy.

Work is assumed will continue to have a comparative advantage in social skills and creativity. Governments' development strategies should focus on improving these skills to complement and not compete with computer technology. In addition, the leading trend is the transition to the dominance of flexible working hours. It is one of the biggest drivers of business model transformation in many industries. Coworking, remote work, virtual teams, freelancing are becoming increasingly popular, allowing them to overcome the physical boundaries of the office or even the factory and to rethink the boundaries between their work and personal lives.

Scientists use different methods of cluster identification, depending on the characteristics of available statistics and the hypotheses that cause clustering. These methods range from simple visual isolation to the use of various types of technical algorithms.

For example, the DBSCAN algorithm requires two input parameters: the clustering radius and the minimum number of data points in this circle to be recognized by the cluster. The choice of these input parameters critically affects the shape and size of the identified clusters. For example, the DBSCAN algorithm identified 162 clusters in 25 countries according to the input parameters (13 kilometers (radius) and 2000 (minimum number of patent applications) (WIPO, 2017). The size of the clusters was identified by the number of inventors submitted to the System of inventors from a specific geographical region.

Fig. 2 demonstrates the locations of the world's largest 100 clusters.

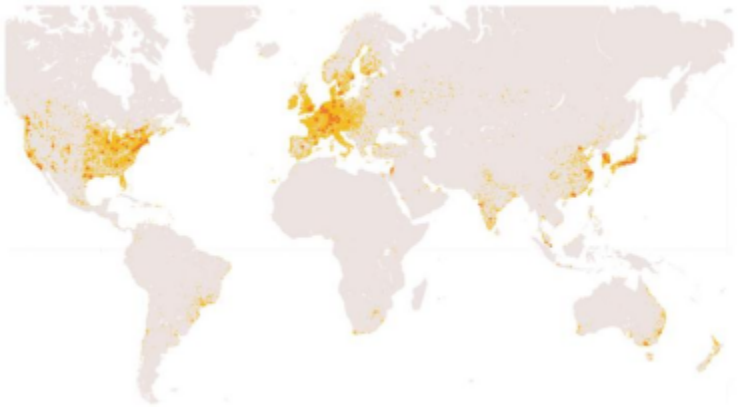

Figure 2. Geographical location of the largest innovation clusters
(based on http://www.wipo.int/ipstats/en/)

The location of the clusters is very uneven. For example, seven countries have four or more clusters: United States (31), Germany (12), Japan (8), China (7), France (5), Canada (4) and South Korea (4). There are from one to three clusters in another sixteen countries. India (three clusters), Malaysia and the Russian Federation (1 cluster) were highlighted among the middle-income countries, except China. The hundreds of largest clusters do not include associations from Latin America and the Caribbean, sub-Saharan Africa, North Africa and Western Asia.

The distribution of clusters across countries is also uneven. Notably, less than half of the 50 states have clusters in the US, and three or more clusters are located in the states California, New York, and Texas. Finally, the cluster around Basel crosses three borders at once.

Detailed characteristics of each cluster that allows you to draw the following conclusions:

Although the largest patent applicant for the most clusters is a commercial company, for some of them it is a university, such as the Massachusetts Institute of Technology for the Boston-Cambridge Cluster. Several commercial companies are leading applicants for multiple clusters. For example, Ericsson stands out as the largest applicant in five different clusters. Siemens and Intel are leading applicants in four different clusters each.

There are pronounced differences in the number of applications submitted by the leading applicants in each cluster. For many clusters this proportion is below 10%, indicating a high level of diversity of applicants. This proportion is higher for other clusters, which indicates a higher concentration of applicants in the cluster.

Clusters are also significantly different in their technological orientation. For example, the Shenzhen-Hong Kong (China) cluster, which is ranked the 2nd, focuses on digital communications technologies, accounting for about 41% of patent applications. On the other hand, the Tokyo-Yokohama cluster is much more diverse, with only 6.3% of applications submitted for its main technological area - electrical engineering, equipment and energy saving. The most popular technological areas are medical equipment, which predominates in 17 clusters, digital communication

(16 clusters), pharmaceuticals (15 clusters), computer technologies (12 clusters). In total, 18 different technologies are dominated in more than one cluster.

The role of universities also varies among different clusters. In some clusters, such as Baltimore, Daejeon, Grenoble, Kuala Lumpur, Singapore, the proportion of universities in applications exceeds 30%. Inventive activity in other clusters is largely concentrated in commercial companies, with academic institutions submitting a small number of applications. Interestingly, universities play a relatively important role in many clusters specializing in medical technology or pharmacy.

Clusters actively interact not only within their boundaries, but also with each other. The distance and size of the cluster in many cases affects the choice of partners. For example, Tokyo-Yokohama is a leading partner for all other clusters in Japan, and Seoul is the most active partner cluster for all other clusters in South Korea. Today the San Jose-San Francisco Cluster is the most active cluster supporting relationships with 24 other clusters, including six clusters located outside the United States.

The process of cluster formation is still poorly understood, as there is no universal recipe for creating an effective cluster. Even ranking and sorting them by different attributes does not allow us to single out many common attributes of successful clusters. Some of the clusters are formed from the bottom, they grow out from a group of active researchers, the rest are targeted at the state level. The core of the innovation cluster is both universities and relevant academic infrastructure, as well as commercial companies. The common to most successful clusters is the presence of a powerful center which often generates the largest number of patents and brings together other players. From the side of the state it is important to give the cluster members wide freedom to choose the sphere of activity, partners, ways of self-organization.

Virtualization of economy as a consequence of dynamic and total process of penetration of information and communication technologies in all spheres of life leads to the emergence of new forms of innovative entrepreneurship. The fierce competition between manufacturers of mass-produced goods is forced them to seek new marketing strategies. Therefore, more and more consumers are beginning to consider themselves as a partner whose opinions on the quality and other properties of the product are most important in their future activities. It contributes to the birth of a new market relations entity, which can be called a prosumer, this is a buyer who satisfies his or her own needs.

The most striking example of new forms of innovative entrepreneurship in recent years have been companies which can be integrated into a common economic system called the Sharing economy. Sharing economy companies provide services related to Business to Business, Person to Person, Business to Person, Person to Business, Machine to Machine. The main distinguishing feature of new companies created within the Sharing economy is the degradation of the role of intermediaries. The first startups with the help of new technologies offered services and products based on Person to Person. Thus, virtualization and ICT again lead to the disappearance of another key element of the market system - an intermediary. With the rise of information and technological literacy of the average consumer, the need

for an additional link between him and the manufacturer simply disappears, because the consumer is already able to determine what goods he needs, find his manufacturer and contract a mutually beneficial agreement. The traditional model of industrial society is being undermined: corporations are the owners; the consumers are the people. Now a person can embody both roles: consumer and owner. The Wikipedia online encyclopedia, a nonprofit project, began operating in 2001.

If global companies build their business based on the standardization and unification of their products and services, the Sharing Economy Services enables the user to obtain unique, authentic and personalized services and products. Currently, about one hundred large companies offer similar services: ParkingPanda, PogVacay, Rentoid, SnapGoods, Liquid, Zipear, relayRides, Getaround, SideCar, Lyft. Almost all business models deployed by companies in the Sharing economy have a similar structure. They are a platform or online marketplace through which demand for certain assets or services is reduced by ownership of those assets and services by others. The assembly mechanism can be driven by demand (e.g. Peerby), supply (e.g. Sorted) or combination of both methods (e.g. Fixura). A graphic representation of the Person to Person business model is shown in the figure. The Person to Person platform enable to participants to post their own query to which a common pool of participants can respond (Figure 3).

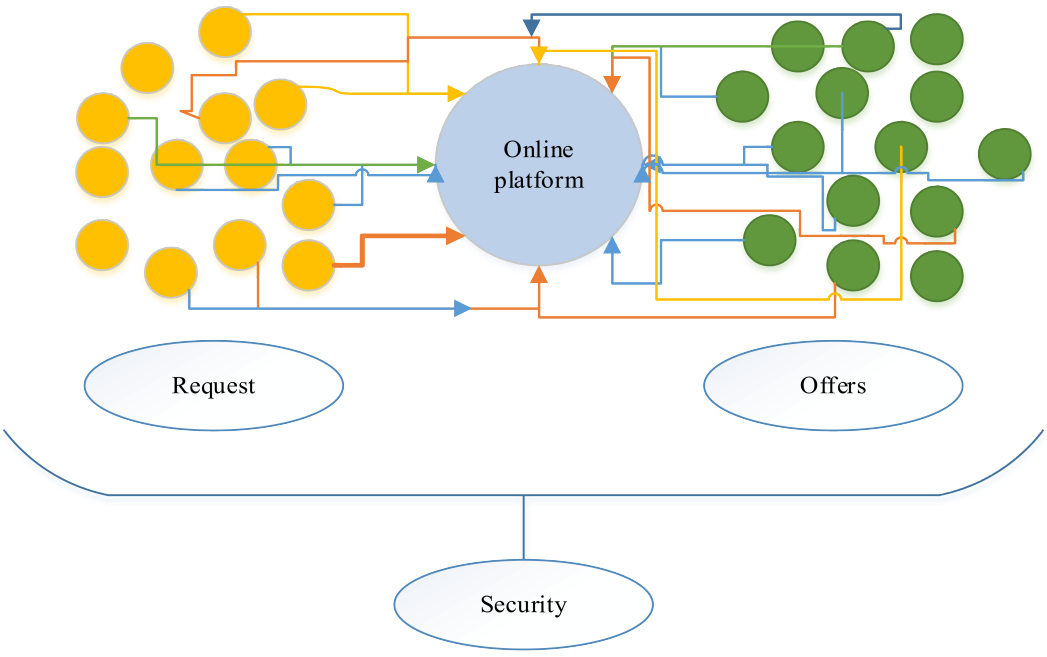

Figure 3. Sharing economy business model (author's development)

Among prerequisites for the emergence of a new business model are: development of technology (for example, the widespread distribution of 3-D printers), emergence and growth of the popularity of social media and social networks, advancement of mobile technologies, new consumer motivation, reducing their confidence in the corporate world.

Thus, social innovation on a modern information basis became a new phenomenon. A social-innovation idea providing greater access to knowledge and information for low-income people may not be completely new in other places and environments, but its application in this community may be innovative and useful. In this context, particular attention should be paid to technologies that provide service to Sharing economy platforms, their advantages and disadvantages. Technology plays a secondary role here because it only helps to flesh out the idea.

The classical market economic system has always relied on private property as the basis of all subsequent relationships. Sharing economy changes the focus: it brings us back to the joint or distributed production and consumption of goods and services. Although the practice of sharing has historical roots, it has re-emerged and developed thanks to new technologies bringing strangers together and facilitate communication.

The most startups are created in these areas. Sharing economy involves the presence of two elements: the existence of physically divided goods that systematically have excess production capacity, and the motivation to share them.

Joint consumption and Sharing economy are often used synonymously. However, Rachel Boatsman stresses that these concepts should be distinguished. In case of joint consumption, the focus is primarily on the idea of exchanging, dividing, trading or renting goods and services; it involves the transfer of ownership, either temporarily or on a permanent basis, which does not occur in the Sharing economy (e.g., Uber, Lyft, Zipcar).

We can say that the Sharing economy is the transition of real life affairs into the digital space: personal life becomes a part of the community. New digital technologies are used to adapt the practices, norms and values of privacy to the norms of the whole society. It is clear that this community is significantly different from traditional forms of market relations. Participating in Sharing Economy projects, we do not expect to receive direct and prompt benefits; we are not forced to follow specific community rules, everyone makes their own choices. The business model of a common property economy violates traditional forms of business organization, but personal rights are always dialectically linked to our lives as a part of a community or state, and these relationships should not be regulated in the same way as our relations with the market.

Attracting a wider range of users to the Sharing economy puts scientists at a dilemma: it either gives ordinary citizens more opportunities to earn money, or replaces traditionally safe and secure jobs, occupations on temporary and low-paid jobs. The person has the opportunity to independently choose the level of employment, working hours and get additional earnings.

The key factor that determines the level of success and acceptance of the Sharing economy business model and requires separate research is the culture and characteristics of local markets. Therefore, the key to the success of these enterprises is to operate in those countries where the local culture is open to innovation and overcoming traditional business models.

Conclusion

At the beginning of the XXI century the global economy emerges as a unique self-replicating network system whose nodes are in interdependent, asymmetric, politically and economically determined relationships. Its main features are global exchange of goods and services, factors of production primarily in the form of international movement of capital, labor and technologies, global organization of transnational production, logistics infrastructure, self-sufficient financial sphere, regulation of the activities of global market entities in order to ensure the balance and dynamism of economic development. The multidimensionality and imperfection of the global economy qualitatively transforms the mechanisms of competition, the resource and ideological basis of them are information and communication technologies.

A dramatic change is expected in the subjective architecture of the global economy, dispositions of countries and regions of the world. The public and corporate sectors are responding to new economic realities with the emergence of global strategic management, which aims to offset risks and benefit from global unification and standardization in all areas of the economy.

As a result of digitization by the 2020s, most professions will require candidates with completely new competencies: ability to work with large databases, development and algorithmization of tasks, visualization and presentation of management decisions. Introduction of artificial intelligence into mass production will reduce the number of traditional jobs while digital technology and robotics will create jobs for highly educated workers. The labor market, which is affected by mobile communications, the internet of things, robotics, big data technologies will undergo a dramatic transformation. The education system needs to be constantly modernized, which should be guided by modern general and special competences. Priority is given to the ability to solve complex problems by accumulating and using knowledge from various fields. Unlike lower technology, along with ability to work with large amounts of data and make fast decisions, the latest technologies require a person to conduct a thorough analysis of filtered data, visualize and present management decisions. A lifelong learning model becomes necessary.

Virtualization of the economy as a consequence of the dynamic and total process of penetration of information and communication technologies in all spheres of life generates the new forms of innovative entrepreneurship, for example, in the context of Sharing economy, which is built on exchange and joint ownership of resources and includes the following types of business: joint production, distribution, trade, consumption of goods and services when a key element of the market system - the intermediary - disappears. In this context, it is important to supplement the common classifications of social innovations with the emphasis on the economic performance of their implementation by the criterion of development / disruption of business and industry.

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Olesia Tomchuk,
PhD in economics, Associate Professor,
Vasyl' Stus Donetsk National University, Ukraine
ORCID: https://orcid.org/0000-0002-1817-7483

Olha Abramova,
PhD in economics, Associate Professor,
V.N. Karazin Kharkiv National University, Ukraine
ORCID: https://orcid.org/0000-0001-6372-9542

INDIVIDUAL AND GROUP COMPONENTS OF THE STRATEGIC INNOVATIION DEVELOPMENT OF THE COMPANIES

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Abstract. *The article highlights the basic theoretic and methodological framework on the implementation of selected components and the coherent complex of strategic innovation development for companies. One modeled a unified way of setting up strategic innovation development, based on the identification of formalized stages and methodological approach in the form of the interaction between the company's goals and its resource component. The major criteria of acceptability were expressed for each of the vectors of the innovative development of the company in light of the factors of the external environment. One developed the methodological basis for implementation and evaluation of the innovation strategy of the company on the principles of goal-setting and the target model implementation.*

Key words: *strategic innovation development, external environment, components of strategic development, assessment of efficiency, resource component.*

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Introduction

The innovative development is one of the perspective ways to economic growth for companies. The management practice shows that innovative changes in the modern stage of the companies' development can provide not only high figures of economic growth but also improve their competitiveness, export potential, and solve economic, ecological, and social problems. The innovation activity is one of the key components of the provision of the successful functioning of companies. That is why modern economic conditions require intensive innovation activity, effective research, and invention organization, change adoption, innovation risks reduction, and strategic management in the innovative activity of each company.

The innovation development in the company is a complex process that requires careful planning and management of the innovation strategy tools according to the particular capabilities of the companies, based on the results of the evaluation of all forms of possible innovative activities. At the same time, the target of choosing an effective direction of innovation development of the company lies in the

determination such an optimal variant from the range of alternatives, which in the process of the innovation adoption would reflect the future behavior of the company in regard to the external environment, namely, to other business entities, taking into account individual internal capabilities.

As you can see, the list of factors, which require analysis, can be boiled down to the concept of the resource component as the individual potential of the company and the realization of goals that make the chosen strategy unique and original. The formation of the goal as a component from the range of factors is due to the fact that strategic targets of the company, directed at an extensive conquering of the market, greatly differ from the strategic tasks of the company, which hardly makes the ends meet.

Literature Review

The relationship of the innovation strategy with its resource allocation was highlighted by the researcher Afuah (2009). He determines the innovation strategy as a system of conceptual installations that come up out of long-term targets and define the character of the resources allocation between the development pathways of the system as well as their reallocation in the case of the changes within external and internal conditions of its work. Burgelman, Christensen & Wheelwright (2004) put the content of strategic innovation management into the timely concentration of efforts on the assimilation and use of the promising scientific and technological research, and timely resource provision of innovation dynamics to achieve the goals of the company, thereby creating the conditions for long-term efficiency of its activity.

Robben & Roks (2010) think that it is the resource set, which determines the phases of the innovation development of the companies, which he proposes to rank starting from the least risky, requiring the least amount of effort investments: managerial innovations, market innovations, modernization innovation, technological updating, and technological innovations. The work of Drucker (1985) serves as the methodological basis for the determination of the given phases. It depicts the classification of resources of the innovative ideas and research investigations of the American scientists regarding the expenses on the innovation activity, which are grouped according to its specific directions and highlighted in the research work.

While recognizing such an approach to the definition of the stages of the innovation strategy, we suggest to expand the given set, based on the individual and group components of the innovations in relation to the innovative goals, keeping to the concept of the stage formation, starting from the least risky and least expensive ones, and treating the innovation strategy as the set of components, inherent to different types of innovative activity (Johnston & Douglas, 2013). The restatement of such a principle of the stage formation is found in the works (Schroeder, 2013), who states that the types of a strategy of any level depend on the prevailing type of the innovation. The research investigations (Freeman, 1987; Talke, Kock & Salomo, 2011) treat the scientific and technical, technological, social and social-organizational innovations as a substantive component of the innovative strategy. The indirect

reference to the phases of the innovation strategy is found in the classic classification, developed (Schumpeter, 1934), who distinguished five types of innovations:

– the production of a brand new product or a product with a qualitatively new level of properties;

– the adoption of new ways of production that will be based on the new scientific discovery or a new approach to commercial use of the goods;

– the development of a new sales outlet by the specific industry of the production sector of the country, regardless of its prior existence or absence;

– the development of new resources of raw materials and semi-finished products irrespective of whether they existed earlier or not;

– the introduction of new organization forms.

Methods

One should base his choice of the innovation strategy on the analysis of the key factors, which characterize the company's activity: the state of industry and place of the company in this area, objectives of the company, interests and attitude of higher management, financial resources, skills of workers, the company's responsibilities, the rate of dependency on the external environment, and the time factor.

By considering the company's development as a continuous process of obtaining and expansion of its recourse capabilities, one should mention that since the course of development of each company is strictly individual, and therefore, each company possesses an individual set of resources, one could not miss noticing the impact, produced by the available set of resource on the choice of the company's strategy. By stating that resource allocation in the organic combination with the strategy objectives is a crucial factor that is able to influence the choice of a specific type of the innovation strategy by the companies, we are going to study the interaction of these two factors and their influence on the formation of the strategy of innovation development to the companies, noting that the innovative goals of the company derive from the general strategic objectives, and the company's resource set forms the required innovation potential.

The development of the strategy includes the process of analysis and identification of strategic benchmarks on the market, which correct and find their reflection on the form of various strategic programs and projects. The innovative goal as the constituent of the general strategic objectives constitutes the desired result of the company's activity (specific executants and responsible executives) innovation that is carried out within a limited period of time, based on the limited resources, and directed at qualitative (revolutionary) development of the company. Therefore, the definition of the innovative goals, which makes it possible to direct strategic innovative decision to accomplish specific tasks, related to the company's activity, should take place based on the realization by the team management of their internal capabilities, presented by the available innovation potential. Accordingly, the management of the innovation development, oriented at achieving the given goals, can be effective only if specific strategic goals can be supported by the realism of their content.

Results

Strategic innovation development of the company

The innovative development management of the company goes far beyond the determination of the objectives of the innovation strategy and requires evaluation of the possibilities on their implementation. In this context, it means that the innovation goal forms a vector of development, which is called to provide the achievement of goals. However, the company can obtain better results only if the target goals of the company correspond to the existing innovation potential, through which the development of the company takes place. That is why the choice and implementation of the innovation strategy depend on the state of the innovation potential, the formation of which can take place using the components and elements of the company's internal environment. The input bundle (financial, material, informative, social, etc.), the company possesses, forms its innovation potential and characterizes its readiness to systematic innovative growth, thereby influencing the structure and directions of the innovation strategy (Figure 1).

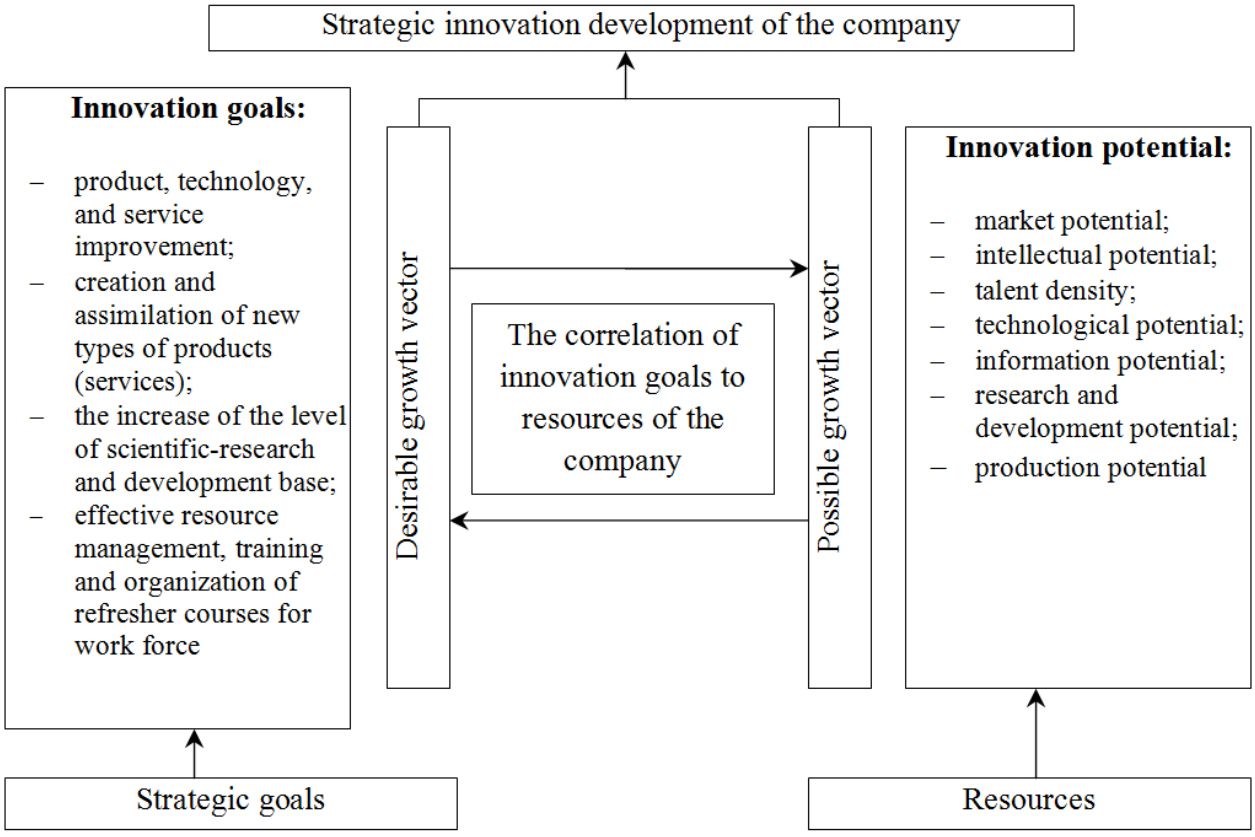

Figure 1. The formation of strategic innovation development of the company jointly with the goals of the company and its resource component

The modern classification of innovations distinguishes the following types of companies, based on the content of their activity: technological, manufacturing, economic, trading, managerial, and social innovations. Having modeled the received results on the area of strategic activity, we will construct the process of choosing an innovative strategy in the form of the combination, including the following components: social-psychological – organizational and management – marketing –

economic – manufacturing – scientific and technical (Aiman-Smith, et. al., 2005). Such an approach to the phases of the innovation strategy characterizes innovation activity as actions, aimed at bringing a wide range of innovations under cultivation (adoption), which have relation to:

- the production of new products and services;
- the adoption of new technologies and/or mastering of new techniques;
- the use of new sources of raw materials;
- the introduction of new forms and methods of industrial engineering techniques, labor, and management;
- market development or the promotion of new markets.

The stage of formalization and implementation of the innovation strategy of the company

We believe that it is appropriate to form the phases of the innovation strategy using the gradual formation as it allows to simultaneously (parallel) adopt the homogenous innovations and gradually form the adoption of the interdependent innovations, distributing innovative goals between the phases of the innovation strategy on one hand, and efficiently reach the target goal of the systematic innovation development by integration of subsystems of the company on the other hand (Figure. 2).

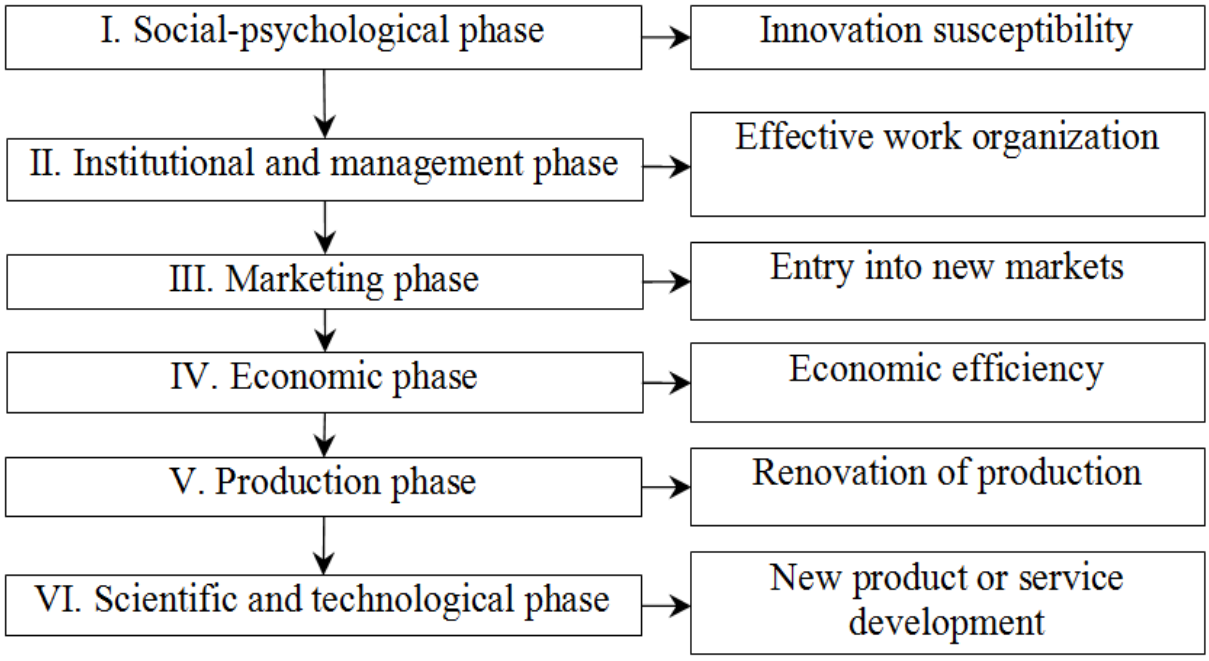

Figure 2. The system of innovative goals teaming up with the phases of an innovation strategy

Let us have a closer look and analyze each of the given phases of the innovation strategy in detail (Table 1).

The socio-psychological phase is the basic element in the formation of any type of innovation development strategy, which includes the availability of professional personnel, the necessary knowledge and information, experience, motivation, and strategic innovative thinking in the company (Balsano et. al., 2008).

Table 1. Phases of the innovation strategy of the company

Type of innovation activity	Lines of activity
Social-psychological	• the adoption of new forms of staff activation (the promotion of creative search, use of new knowledge, improvement of labor protection conditions, health protection, etc.); • staff training and reeducation; • the improvement of professional standards of employees; • the formation of susceptibility to innovations, strategic innovative thinking.
Organizational and management	• the improvement of the organizational structure and system of management; • the adoption of new industrial engineering techniques; • service improvement; • the improvement of control forms; • the change of interaction methods with the supplementary and auxiliary departments.
Marketing	• the new directions of the market boundaries expansion (coverage of new market segments, new ways of the product use, and entry into new regions); • the diversification of production and sales (the offer of novelties on the new markets, promoting traditional directions of the company's activity; the offer of novelties on the new markets, which have no relation to the former types of activity, orientation on new markets); • the new methods of the price policy; • the new forms of interaction between suppliers and requestors; • the new ways of the product promotion and improvement of the trade process efficiency.
Economic	• the new financial instruments and methods of the cost distribution; • the improvement or modification of the financial system; • the change of methods and ways of planning; • cost-saving; • the rationalization of an accounting system; • the investment policy.
Manufacturing	• mastering new types and sources of supplies, materials, and/or new approaches to the use of traditional ones; • the expansion of production capabilities; • the improvement of labor efficiency; • the change in the structure of production.
Scientific and technical	• the adoption of new or modified technology; • the adoption of new or modified product models; • the environment protection measures implementation; • the scientific development and research practice.

Let us use the scale given in the research (Tidd & Bessant, 2014), which is regarded as the most efficient tool to use, compared to the rest of the scales of this type, for expert evaluation of paired comparisons and the possible type of a strategy.

Let us hold the evaluation of the correlations between the acceptance criteria for each component of macro-environment in the groups of paired ratio on two levels and mark the first component as the economic factors {a company, customers, suppliers, competitors, labor market} through *X = {x1, x2, x3,x4,x5}*, the second component as the technological factors {a company, consumers, suppliers, competitors, labor market}through *Y = {y1, y2, y3, y4, y5}*, the third component as the political factors {a company, customers, suppliers, competitors, labor market} through *Z = {z1, z2, z3, z4, z5}*, the fourth component as the social factors {a company, customers, suppliers, competitors, labor market} through *C = {c1, c2, c3, c4, c5}*, and the fifth component as judicial factors {a company, customers, suppliers, competitors, labor market} respectively *K = {k1, k2, k3, k4, k5}*. The identified groups of correlations were set by the matrices respectively *{XY}, {YZ}, {ZC}, {CK}* (at the very beginning, in the course of the model formation, the matrices were filled with random values, generating in accordance with the normal law of the random variable distribution). After that, one determined the major acceptance criteria for each of the vectors of the instant environment.

For the first component (economic factors {a company, consumers, suppliers, competitors, labor market}) we use the markers: $x^1 = \{x^1_{1,12}, x^1_{2,1}, x^1_{3,1}, x^1_{4,3}, x^1_{5,5}, x^1_{6,19}\}$, $x^2 = \{x^2_{1,4}, x^2_{2,3}, x^2_{3,6}\}$, $x^3 = \{x^3_{1,5}, x^3_{2,4}\}$, $x^4 = \{x^4_{1,3}, x^4_{2,4}\}$, $x^5 = \{x^5_{1,3}\}$; for the second component (technological factors {a company, consumers, suppliers, competitors, labor market}) – $y^1 = \{y^1_{1,12}, y^1_{2,1}, y^1_{3,1}, y^1_{4,3}, y^1_{5,5}, y^1_{6,19}\}$, $y^2 = \{y^2_{1,4}, y^2_{2,3}, y^2_{3,6}\}$, $y^3 = \{y^3_{1,5}, y^3_{2,4}\}$, $y^4 = \{y^4_{1,3}, y^4_{2,4}\}$, $y^5 = \{y^5_{1,3}\}$, for the third component (political factors {a company, consumers, suppliers, competitors, labor market}) – $z^1 = \{z^1_{1,12}, z^1_{2,1}, z^1_{3,1}, z^1_{4,3}, z^1_{5,5}, z^1_{6,19}\}$, $z^2 = \{z^2_{1,4}, z^2_{2,3}, z^2_{3,6}\}$, $z^3 = \{z^3_{1,5}, z^3_{2,4}\}$, $z^4 = \{z^4_{1,3}, z^4_{2,4}\}$, $z^5 = \{z^5_{1,3}\}$, for the fourth component (social factors {a company, consumers, suppliers, competitors, labor market}) – $c^1 = \{c^1_{1,12}, c^1_{2,1}, c^1_{3,1}, c^1_{4,3}, c^1_{5,5}, c^1_{6,19}\}$, $c^2 = \{c^2_{1,4}, c^2_{2,3}, c^2_{3,6}\}$, $c^3 = \{c^3_{1,5}, c^3_{2,4}\}$, $c^4 = \{c^4_{1,3}, c^4_{2,4}\}$, $c^5 = \{c^5_{1,3}\}$, and for the fifth component (judicial factors {a company, consumers, suppliers, competitors, labor market}) respectively – $k^1 = \{k^1_{1,12}, k^1_{2,1}, k^1_{3,1}, k^1_{4,3}, k^1_{5,5}, k^1_{6,19}\}$, $k^2 = \{k^2_{1,4}, k^2_{2,3}, k^2_{3,6}\}$, $k^3 = \{k^3_{1,5}, k^3_{2,4}\}$, $k^4 = \{k^4_{1,3}, k^4_{2,4}\}$, $k^5 = \{k^5_{1,3}\}$.

For defining the correlation between $\{XZ\}$, $\{XC\}$, $\{XK\}$, $\{YC\}$, $\{YK\}$, $\{ZK\}$ among other components of a macro-environment, we perform sequential closure of ratios using the compositional rule, which for the closure of the ratio $\{XY\}$ on the ratio $\{YZ\}$ has the following form:

$$(x_i, z_j) = \frac{\sum_k ((xy)_{ik} \times (yz)_{kj})}{\sum_k (xy)_{ik}} \quad (1)$$

The compositional rule type (1) is also used to find the closure of the newly obtained ratio on the ratio figures, which was put based on the expert estimations (the figures are rounded up to the whole number).

The compositional rule is used in the same way to find the closure for other correlations, used by the corresponding matrices:

the ratio $\{XZ\}$ on the ratio $\{ZC\}$ for receiving $\{XC\}$:

$$(x_{i,}\ c_j) = \frac{\sum_k ((xz)_{ik} \times (zc)_{kj})}{\sum_k (xz)_{ik}} \quad (2)$$

the ratio $\{XC\}$ on the ratio $\{CK\}$ for obtaining $\{XK\}$:

$$(x_{i,}\ k_j) = \frac{\sum_k ((xc)_{ik} \times (ck)_{kj})}{\sum_k (xc)_{ik}} \quad (3)$$

the ratio $\{YZ\}$ on the ratio $\{ZC\}$ for getting $\{YC\}$:

$$(y_{i,}\ c_j) = \frac{\sum_k ((yz)_{ik} \times (zc)_{kj})}{\sum_k (yz)_{ik}} \quad (4)$$

the ratio $\{YC\}$ on the ratio $\{CK\}$ for receiving $\{YK\}$:

$$(y_{i,}\ k_j) = \frac{\sum_k ((yc)_{ik} \times (ck)_{kj})}{\sum_k (yc)_{ik}} \quad (5)$$

the ratio $\{ZC\}$ on the ratio $\{CK\}$ for obtaining $\{ZK\}$:

$$(z_{i,}\ k_j) = \frac{\sum_k ((zc)_{ik} \times (ck)_{kj})}{\sum_k (zc)_{ik}} \quad (6)$$

The ratios obtained after the application of these compositional rules are characterized by matrices (the figures are rounded up to the whole number). Thus, the data obtained on the given phase of analysis make it possible to determine the quantitative ratios between the factors of the second hierarchical level of the business environment – how meaningful is each of the components, compared to other components in this hierarchy.

The methodological component of the company's innovation strategy implementation and evaluation

By strategic innovative thinking, we mean a new creative approach to strategic thinking (irrational thinking), which makes the company completely different from its competitors in the innovative sense and makes it possible to use drastically new approaches to customers; and is characterized by the realization of the fact that the changes take place much faster, and the future will be much different from the way we imagine it to be now.

The essential nature of socio-psychological phase in the work (Sullivan, 2010) is included to the notion of the innovative management and is expressed through the process of management of new knowledge, the creative potential of the new knowledge creators, the introduction of innovations, social and psychological aspects of innovations implementation. Social-psychological innovations can be also regarded as psychological readiness of the company to innovations and as a system of methods on the formation of the interest of the team to innovative transformations, without which all other phases will not be effective enough, which is confirmed in the research (Wischnevsky & Damanpour, 2008).

The importance and priority of this stage consist in the study of other phases of the innovation strategy as those based on the socio-psychological innovations as their content lies in the introduction or anticipation of the new patterns of corporate behavior, reflected in the implementation of other innovations.

While studying the research methods of the company, Marinova & Singh (2007) put an emphasis on the following peculiarities of social innovations:

1. dimensions – the social innovations have a larger sphere of application, compared to the material ones;
2. the dependence of social innovations on the group and individual traits;
3. the absence of the manufacturing phase;
4. a relatively small amount of expenses for implementation of social innovations, but more stressful as they have a relation to the interests of people.

The organizational and managerial phase includes the totality of innovations, aimed at improvement of the organization structure, style, methods of decision-making, the use of new means of data and document processing, rationalization of administrative work, the change of methods and ways of planning of all types of production and business activity, the improvement of kick-off meetings (methods of material incentives, increase of the employees' interest), and rationalization of accounting system (Govindarajan & Trimble, 2005). Thus, the innovations of this phase can be determined as the totality of solutions, methods, and forms of the activity organization and management, which differ from the currently used in the company by their novelty for the given company. The organizational and managerial innovations are associated primarily with their low capital intensity in relation to maximum efficiency and quick implementation, and they can be presented in the company in two main forms (Dillon et. al. 2005):

- the organizational innovations do not have relation to technological innovations, the target goal of which is the improvement of activity and use of the corresponding labor resources and company property;
- the organizational innovations, cause by technological innovations.

The American researchers offer to express the general of the acceptance of the organizational and managerial innovation by the companies in the following way (Anderson & Markides, 2007):

$$Ch = f(L, S, K) \tag{7}$$

where *Ch* – the acceptance of innovations by the companies;

L – personality and psychological characteristics of members of the organization;

S – the characteristic of organizational structure (structural changes);

K – the characteristic of environmental and inter-organizational relationships (contextual changes).

This formula shows the priority of socio-psychological innovations. Therefore, the organizational and management innovations belong to the second stage of strategic innovative development of the company.

Organizational and managerial innovations gradually replace technical and technological innovations in terms of their efficiency. The innovations of this phase should be adopted in the company in the form of modern management concepts. The principles of these concepts and problems of their introduction are highlighted in the work (Ahmed & Shepherd, 2010), while the directions of their use in the innovative development of the company, depending on the objective of the innovation development and implementation of the corresponding concept are depicted in the work (Prince et. al., 2014).

The next marketing phase of the innovation strategy formation takes place through marketing innovations and includes the use of the latest technology and ideas regarding the creation of new products, services, and technologies, contributing to the company's goal achievement in the best way. Marketing innovations run ahead of other types of innovations through their diversity, which is explained by their relatively small cost on one hand and variability on the other hand. The marketing innovation is an introduction of a new method into production, including considerable changes in the design or package of the product, its stocking up, an promotion on the market or assignment of a new price, targeted at satisfaction of the consumer's needs, development of new markets or gaining new positions for the company's products on the market to increase its sales results.

Among the most widespread types of marketing innovations, one can distinguish the following ones (Schindehutte & Morris, 2009): the use of new methods of marketing researches, the choice of new strategies of the market segmentation, the chance of the product portfolio policy, the modification of the product life-cycle curve, the use of a new pricing strategy on the establishment of the exit price or the discount system, and the development of new trade channels.

However, one should mention that the marketing phase of the innovation strategies formation often follows as the necessary component of the production and scientific and technological phase, especially when it comes to the development of product innovations, although it may have an isolated character, for example, efficient promotion of an old product or services.

The economic phase of the innovation strategy is characterized by the changes in the financial, accounting, and other spheres of economic activity of the company, new methods, and figures.

Economic innovations are a combination of economic resources, which are reflected in the creation of new methods, indicators, and approaches to carrying out economic activity. The creation of such innovations is connected with a chain of continuous improvements, the combination of ready-made elements, as a result of which we have an innovation in the given area.

While studying the economic innovations, Schroeder, (2013) gives the following examples of the company activity: the introduction of the new finance system to make the money motivate the efficiency of the economic activity of the given company; the system of payments, which can provide the material motivation

for all groups of employees, the growth of the labor efficiency; and the system of advanced planning.

Thus, the economic innovations, in contrast to the innovations of the above-mentioned phases, can be used for both the needs of the innovator and for sale (this peculiarity provides a link between the innovations of this phase and innovations of the engineering and manufacturing and scientific and technological phases).

The manufacturing stage is related to the production or modification of modes of manufacture and is therefore determined by the production potential of the company, which characterizes the ability to stable production activity within the framework of the chosen strategy under the condition of a complex and variable external environment. The innovations of this stage relate to all components of the organization of business and operating system and act as the innovative changes of the given manufacturing system, which transform those factors of the production, which are found at “the system entry”.

One distinguishes three main directions of innovations in the area of modern manufacturing technologies:

1. the transition from discrete (cyclic) technologies to continuous (stream) production processes regarded as the most effective ones;
2. the introduction of closed (uninterrupted) processes included in the manufacturing process as the most economically neutral ones;
3. the improvement of science-intensiveness of high and new technologies as the most desirable ones in business.

The technological innovations, included into this phase, are the eventual outcome of the innovative activity, which is obtained in the form of a new or advanced technological process. Herewith, the innovations of the manufacturing phase should not be detached from other processes of the company. In the majority of cases, they are preceded by the corresponding innovations related to organization and management, the motivation system, with the compulsory consideration of the workers’ physical and social-psychological traits.

The next scientific and technical stage of formation of the innovative strategy deals with the establishment and bringing the new products, materials, services, scientific research and scientific and development innovations under the cultivation within the framework of the close relationship with global achievements of science and technique, the availability of self-engineered scientific products. The innovations of this stage can be characterized as the most drastic and risky ones.

The scientific and technical stage is related to the availability of the scientific and technical potential in the company, which is defined by the levels of development of the scientific and technical staff potential, the experimental base, nonmaterial assets that have already been completed by R&D, and scientific and technical patents. By highlighting the nomenclature updates, (Grebel, 2007) assumed that the transition from the old products to the new ones requires not only switching to the new technology of production but also its management improvement, engagement of new highly qualified workers, etc. The knowledge as a factor of new economics is a significant constituent of this phase, which integrates into the goods and services on

this stage through the introduction of an innovative product (service), the granting of licenses, concluding a cooperation in the framework of common companies or strategic alliance, and the formation of a new company (Tse, 2013).

The phases of planning and development of the company's innovation development strategy are connected to the formation of the complex plan on further innovative activity, the key feature of which is the long-term orientation on reaching the strategic goals of the company. The harmonization of the company's capabilities (in the given case, innovative potential) with its strategic goals, Wright, Amess, Weir & Girma, (2009) offer to carry out based on the four spheres, reflecting the target orientation of the organization: profit, customer support, needs of the employees, and social responsibility. The comparison of the planned innovation transformations with the goals of the company provides the possibility to give a prior evaluation of the model constituents (Table 2).

Table 2. The consistency of directions of strategic innovation development with the goals of the company

Phase name	Profit	Customer support	The needs of employees	Social accountability
Social-psychological	+	+	+	+
Institutional and management	+	+	+	–
Marketing	+	+	–	+
Economic	+	–	–	–
Manufacturing	+	–	+	–
Scientific and technical	+	–	–	+

The innovation activity is based on the product or services updating, the production of which requires creative activity and administrative control, apart from sufficient resources of marketing supportive tools. Both product and technological innovation become the reason for re-equipment, they rise the need for staff training and the adoption of changes related to the production materials. This means that one can observe particular dependence between the given phase of the innovation strategy and its previous phases.

Discussion

The modern conditions of economic management are characterized by the negative influence of crisis-like phenomena, deficiencies of their investment resources, high level of inflation, financial risks, high rates of credit interest, low level of liquidity positions, and financial responsibility. That is why the companies should regularly hold the innovation activity monitoring, determine its strong and weak points; identify opportunities and threats; shape events on the innovation potential improvement in both statistics and dynamics to provide efficient innovation development in the light of the modern economic conditions. The integration of controlling into the innovative operations management of the company lets to solve the tasks put before it.

Conclusion

Therefore, in the course of identifying the possible alternatives based on the comparison of innovative goals and potential, the phases of the innovation strategy, determined through the spheres of the innovation adoption, consider the innovation development strategy to be a combination of innovative changes in the company. That means that the generation process of the strategic innovation development of the company can be regarded as a dynamic array of six interconnected phases, which logically come out from each other and are characterized by a stable inverse effect both on the previous stages and on their totality.

The given sequence of phases provides the possibility to cover the most racial components of the company's activity, related to: the development and implementation of the development strategy and behavior within the external environment, development and implementation of the strategy in regard to the products produced by the company, development and implementation of a strategy related to the company's personnel, and development and implementation of a strategy regarding the determined goals of the company. The formation of the structure for the innovation development strategy makes it possible to evaluate the size of changes in the course of transition from one alternative to another one. At the same time, if the main choice is done, then the only thing one has to do is to specify and control its implementation in such a way, that he could achieve the desired goal soon. The offered system of phases allows people to cover the transitional stages of the life cycle of innovations in the chain science – technique – production - consumption, the compliance to which might be taken into account in the course of formation of the innovation strategy as the organization-management support. The comparison to the life cycle provides an opportunity to take into account the combination of interests and conciliate the decisions of strategic, scientific and technical, marketing, manufacturing, and other directions to ensure the coordination and action efficiency.

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Yuliia Horiashchenko,
Candidate of Economic Sciences, Associate Professor
University of Customs and Finance, Ukraine
ORCID: https://orcid.org/0000-0001-7020-1412

EVALUATION OF THE INNOVATIVE POTENTIAL LEVEL OF CORPORATE MANUFACTURING COMPLEXES

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Abstract. *The paper proposes the author's methods of assessment conducting of the innovative potential of corporate manufacturing complexes. The format of the indicators calculation of the innovative potential evaluation at the stage of creation and innovations development has been isolated and provided. The system of indicators in the model of the innovative potential estimation of the corporate manufacturing complex was proposed. A methodological approach to the evaluation of innovative potential of the corporate manufacturing complex was developed based on the mathematical algorithm and interval estimates. A mechanism for managing the innovative potential of the corporate manufacturing complex has been formed..*

Keywords: *innovative potential, corporate manufacturing complex, evaluation methodology, innovations, innovative development, factor characteristics of potential.*

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Introduction

Innovations play a paramount role in the modern economy, becoming the main element of its functioning. Without innovations it is impossible to ensure the growth of the level of productive forces, to create conditions for the effective development of industrial production. Innovation is the basis for improving the quality and competitiveness of products. The ultimate goal of innovative processes is the practical implementation of new solutions, i.e. innovations. Achieving this goal is impossible without formation and functioning of the appropriate mechanism within the corporation allowing to work on the management of innovative processes. However, there is no renewal of the product nomenclature, the innovative potential remains rather low in a number of industrial corporations, which in turn negatively affects the development of the corporation on the whole and its divisions separately. It leads to the problem of improving the formation and evaluation of innovative potential and, as a consequence, the formation of a competitive nomenclature of industrial production (Tsoukas & Knudsen, 2002). The above issues are particularly relevant for modern manufacturing complexes where many market mechanisms, including those for managing innovative potential, are in the process of ongoing transformation and renewal. The unresolved number of theoretical and practical problems in the innovation sphere of corporations' activity made the topic of this research relevant.

Literature review

Research of managing innovative development of industrial corporation is devoted to the leading scientists' papers (Arogyaswamy, Koziol, 2005; Griffith et al., 2004; Lawson & Samson, 2001; Radjou et al., 2012). The problematic issues of providing strategic management for the innovative development of corporations have been revealed in the papers (Corey et al. 2014; Griliches, 1998; Mir & Watson, 2000; Tidd et al. 2001; Wilmott, 2009). Among the world-renowned scientists who study the problematic field of innovation and increasing of innovative potential, we highlight (Christensen, 2003; Delmas, 2002; Strecker, 2007; Styles & Goddard, 2004).

The most scientists' scientific achievements are devoted to the formation of conceptual foundations for managing the innovative development of economic entities at different levels of the economic system, to study prerequisites for ensuring the innovative development of corporations, to identify the economic, technical and technological factors for the activation of innovative processes in the activities of corporations. However, the issues of formation and implementation of the management mechanisms that provide enhancement of innovative potential and methods of its evaluation, taking into account the realities of the modern market economy, remain under-researched.

Metods

We will form the methodological bases of this research on the basis of the following approaches to carrying out the innovation assessment in the environment of industrial corporations and possibility of transition to the accumulation potential of the innovative experience:

1) resource approach to the evaluation considers the innovative potential as setoff resources or its combination, opportunities for their use, it pays attention to the presence of a set of the basic resource elements of innovative potential, and automatically determines the achievement of the set goals of innovative activity;

2) structural approach to the evaluation considers the innovative potential in terms of certain complex components that integrate resources necessary for the formation of innovative potential, allow them to maneuver, according to it such basic elements of innovative potential are highlighted as: human resources, information and methodological, organizational, logistical, scientific, technical, financial potential, etc.;

3) process approach to evaluation links the innovative potential with achievement of the innovation goals of the entities engaged in the development, implementation and commercialization of innovation, study only the use of innovative potential, it is focused only on the implementation and commercialization of innovation, i.e. in the last stages of the single innovative process, distracting from the features of certain resource components and conditions of their formation.

Results

Evaluation indicators of the innovative potential level of the corporate manufacturing complexes

The issues of identifying and evaluating of the innovative potential to form a model for supporting its development take the fundamentally important place in the theory of innovation. It is possible to evaluate innovative potential by creating special questionnaires in which experts submit their marks. Such techniques have no reproducibility property, there are difficult for internal users to apply. There is a methodological discrepancy about the units of different indicators measurement. In our view, it is more rational to use relative indicators, which can be easily calculated by the parameters available to both internal and external analysts. The list of such indicators should guarantee the necessary and sufficient information on the status of innovative potential of the corporate manufacturing complex (Teeratansirikool et al., 2013). An assessment of the innovative potential of the corporate manufacturing complex should be made using an appropriate system of indicators, which vary depending on the stage of development and implementation of innovations, given that an important feature of a corporation's innovative development is its ability to adapt to internal changes and external influences (Tables 1, 2).

Table 1. Indicators of the innovative potential evaluation at the stage of innovation creation

Indicator	Calculation format	Legend
Share of costs for R&D in total costs	$K_1 = C_{R\&D} / C_{al}$	$C_{R\&D}$ - costs for R&D, C_{al} - total costs for manufacturing and selling new products
Share of the number of scientific and technical workers with the scientific degree in their total number	$K_2 = Q_{sf} / Q_{al}$	Q_{sf} - number of employees with scientific degree, Q_{al} - total number of scientific and technical workers
Share of scientific publications on the strategic direction of innovative development in the total number of scientific papers during the year	$K_3 = A_s / A_{al}$	A_s - number of publications on strategic direction of innovative development, A_{al} - total number of publications during the year
Level of providing innovative activity by the research equipment	$K_4 = O_{R\&D} / O_{al}$	$O_{R\&D}$ - cost of equipment for R&D, O_{al} - cost of fixed assets
Share of the value of licenses sold in the current year in the balance profit of the corporation	$K_5 = L / L_p$	L - the value of licenses sold in the current year, L_p - balance profit of the corporation for the same year
Share of the value of licenses sold in the current year in the balance profit of the corporation	$K_6 = L_b / L_p$	L - value of licenses sold in the current year, L_p - balance profit of the corporation for the same year
Number of prototypes developed by the corporation's own forces	K_7	X
Number of prototypes developed to order by a single corporation	K_8	X

Innovative development is carried out on the basis of an appropriate strategy, which is based on the innovative potential of developed innovations, taking into account the impact of the environment. The effectiveness of the innovations strategy of the corporate manufacturing complex depends on the quality of the information received from the external environment and analysis of the internal state. These indicators are used to assess innovative potential.

Table 2. Indicators of the innovative potential evaluation at the stage of innovation creation

Indicator	Calculation format	Legend
Physical deterioration of the equipment for R&D	K_1	X
Physical deterioration of the equipment for R&D	K_2	X
Retirement of the equipment for R&D	K_3	X
Renewal of the equipment for R&D	K_4	X
Share of new technologies mastered in the current year in the total number of technological processes	$K_5 = T_H / Tal$	T_H - new manufacturing processes, Tal - total production processes
Level of informatization of R&D related work	$K_6 = M_I / M_{al}$	M_I - number of job places equipped with computers M_{al} - total number of job places of scientific and technical workers
The level of professionalism of the scientific and technical staff	$K_7 = Q_{nf} / Q_{alf}$	Q_{nf} - the number of scientific and technical workers with basic higher education, Q_{alf} - total number of scientific and technical workers
Level of advanced training of scientific and technical personnel	$K_8 = X_{nf} / Q_{alf}$	X_{nf} - number of scientific and technical staff who have upgraded their skills during the year
Level of profitability of realized innovations	$K_9 = P_I / C_I$	P_I - income from innovation, C_I - costs associated with creating an innovation
Share of new goods in annual sales in the current year	$K_{10} = V_n / V_{al}$	V_n - sales volume of new products, V_{al} - total sales

An analytical review of the available techniques has demonstrated that there is clearly an insufficient amount of development to analyze and evaluate the innovative potential directly. We propose the following system of calculated indicators of the innovative potential of the corporate manufacturing complex (Table 3).

This system of indicators, on the one hand, allows to evaluate the current innovative potential, on the other hand, it includes the most important indicators for each of the components of the innovative potential, which ensures the completeness and complexity of its assessment (Atkinson, 2012).

Table 3. System of indicators in the model of the innovative potential estimation of the corporate manufacturing complex

Innovative potential components, where K-weight of the impact of the component on the innovative potential on the whole (*Ki*)	Indicators of the innovative potential components	The weight of the indicator impact on the relevant component of innovative potential (*Mi*)	Normative value of the indicator (*Ni*)
Financial - *K1*	Coefficient of provision by own funds	*M1*	*N1*
	Coefficient of current liquidity	*M2*	*N2*
	Coefficient of the own funds autonomy (independence)	*M3*	*N3*
Production - *K2*	Share of fixed assets in total assets	*M4*	*N4*
	Share of inventories in current assets	*M5*	*N5*
	Coefficient of the fixed assets disposal	*M6*	*N6*
Business - *K3*	Turnover coefficient of fixed assets	*M7*	*N7*
	Coefficient of the profitability of the own capital	*M8*	*N8*
	Coefficient of the profitability of current assets	*M9*	*N9*
Management - *K4*	Share of intellectual workers in the total staff	*M10*	*N10*
	Share of skilled workers in the total number of staff	*M11*	*N11*
The material and technical component - *K5*	Coefficient of the intellectual property security	*M12*	*N12*
	Share of costs for technological, organizational and marketing innovations in total production costs	*M13*	*N13*
	Coefficient of development of new equipment	*M14*	*N14*

The following comprehensive assessment of the innovative development potential of the corporate manufacturing complex has been proposed on the basis of the indicators system of all components of the innovative potential:

$$K_{ip} = \sum_{i=1}^{n} K_i \times Y_i \quad (1)$$

where: *n* - number of components of the innovative potential included in the integrated assessment;
Ki - the coefficients of the impact significance of the i-th component of the innovative potential.

$$\sum_{i=1}^{n} K_i \times Y_i = 1 \quad (2)$$

Y_i is relative indicators characterizing each i-th component of the innovative potential.

It follows:

$$\begin{aligned} Y1 &= M1X1 + M2X2 + M3X3, \\ Y2 &= M4X4 + M5X5 + M6X6, \\ Y3 &= M7X7 + M8X8 + M9X9, \\ Y4 &= M10X10 + M11X11, \\ Y5 &= M12X12 + M13X13 + M14X14 \end{aligned} \quad (5)$$

where: M*1* … *M14* - coefficients which take into account the impact significance of the indicator on the relevant component of the innovative potential of the corporate manufacturing complex;
X1 ... *X14* - indexes characterizing the degree of conformity of indicators values of financial, production, business, management and logistical component of the innovative potential with the normative value of these indicators.

The total value of the coefficients weights of all indicators within each group of components of the innovative potential is equal to one, i.e.:

$$M1 + M2 + M3 = 1, M4 + M5 + M6 = 1, M7 + M8 + M9 = 1, M10 + M11 = 1, M12 + M13 + M14 = 1. \quad (4)$$

Thus, a comprehensive indicator of the innovative potential of a corporate manufacturing complex can be presented in the expanded form:

$$\begin{aligned} K_1 = {} & K1(M1X1+M2X2+M3X3)+K2(M4X4+M5X5+M6X6)+ \\ & +K3(M7X7+M8X8+M9X9) + K4(M10X10+M11X11)+ \\ & +K5(M12X12+M13X13+M14X14) \end{aligned} \quad (5)$$

Further, based on the analysis of reporting data of the corporate manufacturing complex and calculation of the integrated indicator of the innovative potential according to the formula (5), it is possible to conclude the level of innovative potential formed within the corporate manufacturing complex up to the time of the analysis (Becheikh et al., 2006). The following levels of innovative potential can be distinguished depending on the calculated value of Ki: high innovative potential ($K \leq 2$) , mean innovative potential ($2 > K_i \geq 1{,}5$) and low innovative potential ($K < 1{,}5$).

Methodical approach to the innovative potential evaluation of the corporate manufacturing complex

The methodical approach to the evaluation of the innovative potential of the corporate manufacturing complex based on an integrative approach, as a synthesis of resource, structural and process approaches, which, unlike the existing ones, allows to determine the threefold essence of the innovative potential of a corporation namely to isolate resource, efficient and internal levels, and allows not only to calculate the integrative index of innovative potential, but also to classify corporations by its size (Fig. 1), consisting of such successive stages (Prajogo, 2016; Therrien et al. 2011).

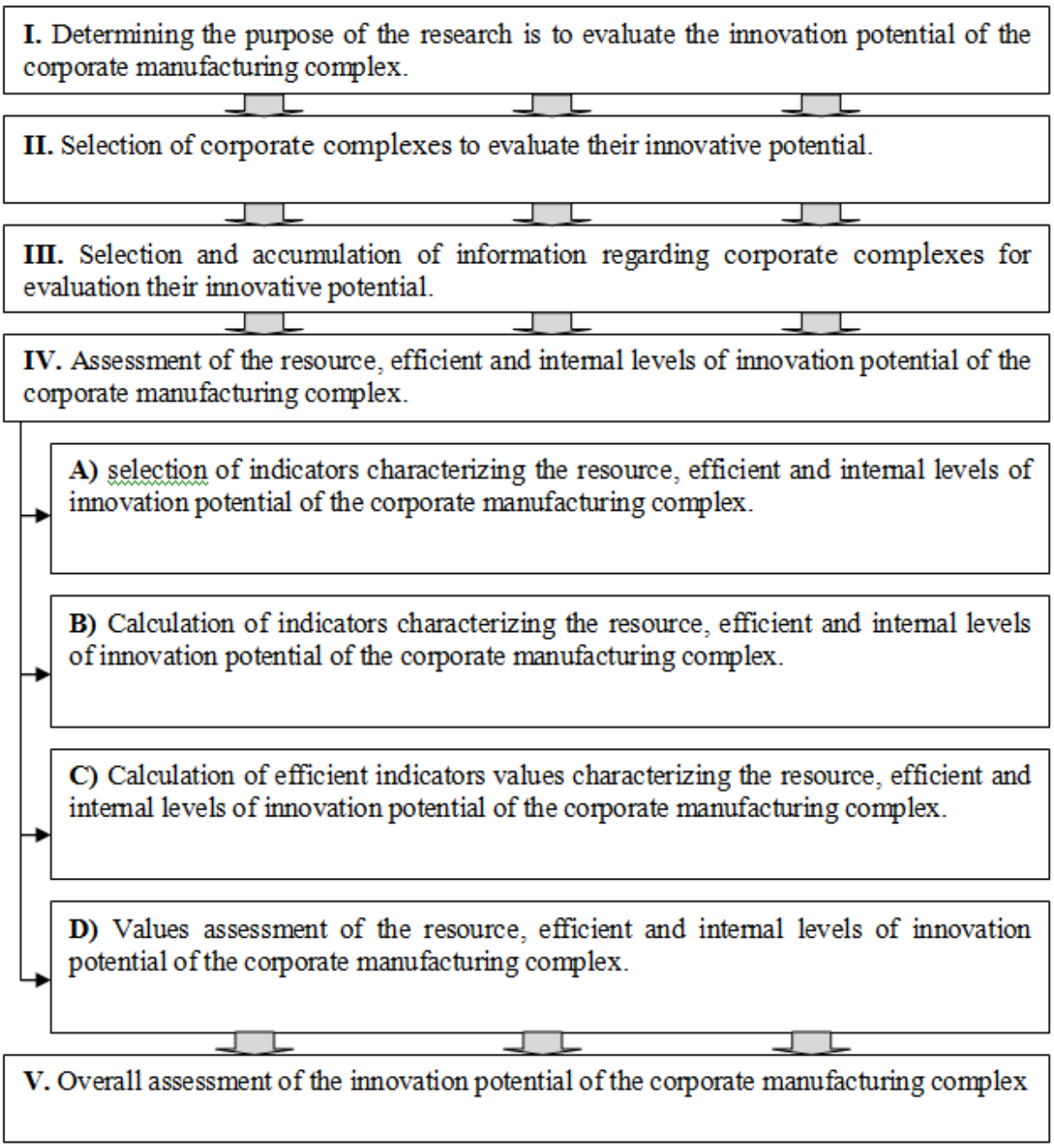

Figure 1. Stages of the methodical approach for the innovative potential evaluation of the corporate manufacturing complex

Exploring the innovative capabilities of such a complex business entity as an industrial corporation, it is necessary to establish a mutual influence on the performance of each of the indicators individually and collectively, to find out the innovative potential of each of the stakeholder groups, its realized and unrealized components (Getz & Robinson, 2003).

Thus, the innovative potential of the industry is a function of many variables:

$$\varphi_{pg} = f(K, t) \tag{6}$$

Definition (6) allows us to investigate the functional interaction of the potential components of an industry in which an industrial corporation operates; to identify the

most influential factors in a set of integrated metrics; to find out realized and unrealized components of potential components.

In order to build the economic and mathematical model, all stakeholders were divided into 6 groups: investors; employees; consumers; state and local authorities; suppliers; partners. The number of indicators affecting the innovative potential of the corporate manufacturing complex differs in each of the stakeholder groups. Therefore, the potential function (7) in each group has a different number of variables depending on the number of indicators $K = K(k_1, k_2, \dots, k_n)$.

For further calculations, each of the analyzed indicators is normalized by the largest of values:

$$k_{ij,norm} = \frac{k_{ij}}{k_{i,max}} \tag{7}$$

This is a classic method of stochastic modeling of economic activity (Macpherson, 2005). It establishes a link between indicators of economic activity when the relationship between them is not strictly functional and may be distorted by other random factors. This method is a quantitative method for determining the closeness and direction of communication between selected variables. The correlation coefficient is calculated by the formula:

$$r_{xy} = \frac{\Sigma_{i=1}^{n}(x_i - \bar{x})(y_i - y)}{\sqrt{\Sigma_{i=1}^{n}(x_i - \bar{x})^2 \Sigma_{i=1}^{n}(y_i - \bar{y})^2}} \tag{8}$$

where x_i, y_i - values of the variables, connection between which is established, $\bar{x}, \bar{y}$ - their average values respectively.

The correlation coefficient demonstrates the strength of the relationship and its nature: if the coefficient is positive, the connection is direct, if negative - the inverse connection. The interpretation of the correlation coefficients is as follows:

$$\begin{aligned}
|r_{xy}| &= 0 && \text{- no connection;}\\
0 < |r_{xy}| &> 0{,}3 && \text{- connection is very weak;}\\
0{,}3 \le |r_{xy}| &< 0{,}5 && \text{- connection is weak;}\\
0{,}5 \le |r_{xy}| &< 0{,}7 && \text{- average connection;}\\
0{,}7 \le |r_{xy}| &< 0{,}9 && \text{- connection is high;}\\
0{,}9 \le |r_{xy}| &< 1 && \text{- connection is very high;}\\
|r_{xy}| &= 1 && \text{- connection is complete}
\end{aligned} \tag{9}$$

At the same time, it is clear that a thorough analysis of economic activity cannot be limited to identifying the impact of individual indicators on the activity of an entire industry. Only an integrated analysis of the cumulative balanced scorecard makes it possible to conclude that the industry has realized and unrealized potential in the sphere of innovative activity. Therefore, we have introduced vector potential functions:

$$\bar{\varphi}_i = \bar{\varphi}_i(k_1, k_2, \dots k_n) \tag{10}$$

where i - number of the stakeholder group, $k_{1norm}, k_{2norm}, \dots k_{n,norm}$ - vector coordinates - normalized values of influence indicators on the innovative potential of the corporate manufacturing complex.

Since we have normalized all the impact indicators by maximum values, the maximum values of the vectors coordinates do not exceed 1. We calculated the values of normalized indicators by the results of statistical studies, so these values form the components of vectors of realized potential $\bar{\varphi}_i^{\text{р}}$:

$$\bar{\varphi}_i^{\text{р}} = \bar{\varphi}_i^{\text{р}}(k_{1norm}, k_{2norm}, \dots, k_{nnorm}) \quad (11)$$

Unrealized potential is the difference between maximum achievable and realized potential. From the above definitions, the realized potential $\bar{\varphi}_i^{\text{р}}$ characterizes ability of the industry to function and practically use the existing opportunities, and the unrealized potential $\bar{\varphi}_i^{\text{Нр}}$ is opportunities for further development. The quantitative side of the introduced vector functions is characterized by their modules. The module of the maximum achievable potential is calculated with the formula:

$$\left|\bar{I}\right| = \sqrt{1^2 + 1^2 + \dots + 1^2} = n \quad (12)$$

The module of realized potential of all stakeholders' groups will be calculated by the formula:

$$\left|\bar{\varphi}_i^{\text{р}}\right| = \sqrt{(k_{1norm})^2 + (k_{2norm})^2 + \dots + (k_{n,norm})^2} \le \sqrt{n} \quad (13)$$

The module of unrealized potential is accordingly calculated by the formula:

$$\left|\bar{\varphi}_i^{\text{Нр}}\right| = \sqrt{(1 - k_{1norm})^2 + (1 - k_{2norm})^2 + \dots + (1 - k_{n,norm})^2} \le \sqrt{n} \quad (14)$$

In formulas (12) - (14), n is the number of indicators in each stakeholder group.

It is advisable to include indicators to the basic indicators of operational activity of the corporate manufacturing complex characterizing the status and efficiency of innovative processes. The state of operating activities can be estimated by the reproducibility coefficient of the innovative process; the efficiency is evaluated by the level of the share of operating expenses in terms of income (revenue) from products sales. The reproducibility coefficient of the innovative process C_i characterizes the adequacy of the innovative process within a fixed period of time. It is calculated by the following formula:

$$C_i = \frac{S_U - S_L}{6 \times \sigma} \quad (15)$$

where S_u , S_L - upper, lower tolerance limits of the controlled parameter;
σ - mean square deviation of the controlled parameter.

Assessment of the reproducibility level is carried out on the following scale:

$$C_i = \begin{cases} \ge 1{,}33 \text{ - controlled process;} \\ (1;1{,}33) \text{ - adequate process within the controlled parameter;} \\ (0;1) \text{ - inadequate process} \end{cases} \quad (16)$$

Assessing the values of the factor traits of the innovative potential of the corporate manufacturing complex, we have highlighted three levels *(y=0; y=c; y=d)* which meet the following qualitative estimates:

$$y = \begin{cases} d - \text{high level;} \\ c - \text{middle level;} \\ 0 - \text{low level.} \end{cases} \quad (17)$$

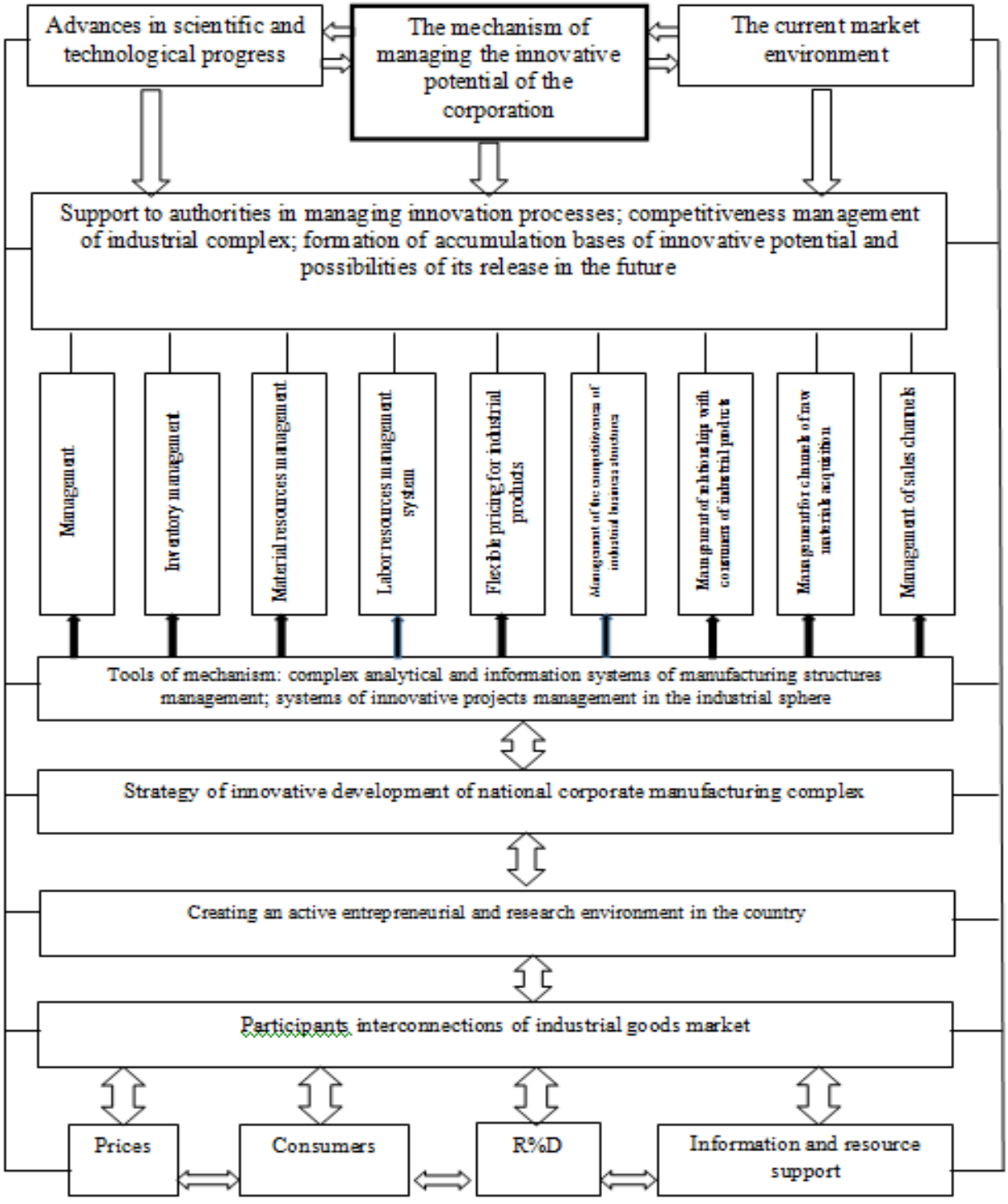

Figure 2. Projections of the mechanism for managing the innovative potential of the corporate manufacturing complex

If you measure the scores on a 100-point scale, the high level will correspond to a value of d = 100 points, an average one to$c$ = 80 points, and an unsatisfactory one to 0 points. The unevenness of the developed rating scale enables to take into account the condition that it is impossible to fully compensate the unsatisfactory value of one of the indicators by the high level of the others. Figure 2 presents the projections of the mechanism for managing the innovative potential of the corporate manufacturing complex.

The level of the innovative potential use of the corporate manufacturing complex, in turn, depends on the quality of the adopted innovative and investment decisions at each stage of the innovative process, as well as on the degree of information provision of this process. Today, there is an urgent need to develop a coherent and flexible management mechanism for industrial innovative potential, which not only has to meet the current requirements of global competition, but also to align the resources and strategic goals of innovative development of the country on the whole.

According to the research result, it can be concluded that formation of a mechanism for managing the innovative potential of the corporate manufacturing complex will facilitate the successful doing business through the introduction of innovative technologies and will give a new impetus for understanding the importance of innovation for the development of the national economy by business systems.

Discussion

Summarizing the research results of the innovative potential impact on the development of the corporate manufacturing complex, we note that innovative processes and development of industrial corporations are two inseparable components of building their effective production and economic activity. In the future we can say that the innovative capabilities of industrial corporations and their innovative potential is the core of the entire potential of the corporate structure of the national economy. For successful operation and comprehensive development of a corporate manufacturing complex in the country, a number of certain conditions are required, which depend on the ability of corporations to constantly transform and increase the efficiency of innovative processes.

The organizational and economic management mechanism of the innovative potential of the national corporate manufacturing complex can ensure the implementation of the chosen strategy aimed at obtaining a high-efficiency result in the program of creating innovative products (services) and high technologies, also it must take into account the elements of market design, which should be conducted for individual parts of the economic entities, taking into account the internal features and demands of the global product market.

Conclusions

The peculiarities of formation and management of the innovative potential of the corporate manufacturing complex have been identified. The authors proposed a system of innovative potential indicators calculation. The conditions for the

formation of a management mechanism of the innovative potential of the corporate manufacturing complex were substantiated. It is determined that in order to manage the innovative activity of the corporate manufacturing complex and to develop a system of measures for the organization and implementation of innovative projects, it is necessary to have a reliable assessment of the innovative potential of industrial production. The prerequisite and important component of innovation is innovative potential, so it is extremely important for the corporate manufacturing complex to know and understand the theoretical basics, patterns of the process of formation, enhancement, evaluation methods and directions of its effective use.

Propositions were developed on the formation of the management mechanism of the innovative potential of a corporate manufacturing complex which should operate on the basis of certain management methods and comply with modern principles: validity, efficiency, complexity, purposefulness, adaptability and flexibility. It was substantiated in the scientific paper that formation of a comprehensive management mechanism of innovative potential will allow to receive feedback from research institutions, to analyze results of their scientific research and to make certain adjustments in different variants of innovative development models of the national corporate industrial complex.

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Sierhiei Sakhanienko,
Dr. habil. of Public Administration, Professor of Public Administration and Regional Studies Chair of Odessa Regional Institute for Public Administration of National academy for Public Administration under the President of Ukraine
ORCID: https://orcid.org/0000-0001-8376-0328

Viktor Robochyi,
PhD Student of Public Administration and Regional Studies Chair of Odessa Regional Institute for Public Administration of National academy for Public Administration under the President of Ukraine
ORCID: https://orcid.org/0000-0002-3436-2523

Maksym Kalinin,
PhD Student of Public Administration and Regional Studies Chair of Odessa Regional Institute for Public Administration of National academy for Public Administration under the President of Ukraine
ORCID: https://orcid.org/0000-0002-6409-9949

MODEL OF ENTREPRENEURSHIP AND COMMERCIAL DIPLOMACY IN THE CONDITIONS OF TRADE GLOBALIZATION

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Abstract. *Commercial diplomacy, being a specific field of diplomatic activity, involves the use by the state in cooperation with non-state actors of diplomatic channels and instruments, both on a bilateral entrepreneurship basis and on a multilateral basis, to facilitate trade and investment in order to provide national companies with business opportunities, to remove barriers for trade and investment, to increase competitiveness and to develop national economies. It is an integral part of the broader concept of economic diplomacy, pursues purely commercial goals and in this terms includes the notion of trade and investment diplomacy. In its historical development, commercial diplomacy has gone through five stages and today is characterized by growing complexity, interdependence and multi-leveledness, transformation of functions and increase of mobility of commercial diplomats, digitization of activities, devaluation of the monopoly role of the state in international economic relations, institutionalization of business participation in the development of international trade policy, updating of global trade agreements.*

Keywords: *trade globalization, entrepreneurship, liberalization, business opportunities, commercial diplomacy.*

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Introduction

Global trade liberalization in the context of rapid development of information and communication technologies creates new opportunities for access to markets and, at the same time, intensifies and distorts competition in them. The complexity, contradictions and unprecedented dynamism of modern transformation processes

place new demands on both the content of trade policy and adequate means of its implementation. Promotion of goods and services to foreign markets through commercial diplomacy is an important tool for the implementation of national economic interests and competitiveness of business for most countries.

Significant changes in models, forms and methods of commercial diplomacy at all levels, in the quantitative and qualitative composition of its subjects, national and regional peculiarities of diplomatic support for the implementation of trade and economic interests in a highly competitive geo-economic environment determine the research interest and the need to generalize and systematize the experience accumulated in this field and justify directions for improving commercial diplomacy.

Literature review

So what distinguishes economic diplomacy is a broader scope and strategic focus on national interests that can go beyond purely economic goals (Ruël, H. (Ed.). (2017)). Therefore, it can be assumed that in addition to commercial diplomacy, economic diplomacy also includes integration, financial and debt diplomacy, as well development diplomacy.

Molendowski, E. (2018) also suggest environmental diplomacy, and rightly so, since climate change also has economic implications.

Gertz, G. (2018) notes the significant security component of environmental diplomacy. In general, energy diplomacy, as well as resource diplomacy have a strong connection with economic diplomacy as through the increase of world population the struggle for resources becomes a matter of strategic interest.

Commercial diplomacy aims to maximize the business opportunities of home country companies by removing all kinds of barriers for trade and investment.

Also, it seems logical that trade diplomacy, at least a part of it, belongs to commercial diplomacy, given that historically commercial diplomacy has been discussed precisely in the context of interstate commercial agreements, which are certainly belong to trade diplomacy. At the same time, one must agree with the argument of Egea, Manuel A., et al. (2020), Lee, D. and Ruel, H. (2012) stating that the macro and micro levels of commercial diplomacy are interrelated and often difficult to separate.

For example, negotiations on the introduction of a free trade regime with another country through the signing of relevant agreements or accession of the country to the WTO (related to trade diplomacy, i.e. diplomacy that accompanies trade policy) provide for preliminary consultations with business (micro-level), on the basis of which negotiation position of the state is formed (Mogensen, K. (2017); Villanueva Lop, G. (2017)). Although it should be noted that business interests are not obvious in all processes and where they dissolve in the state interest without being able to be identified, and trade diplomacy begins, which acquires the traits of economic one.

In the scientific and professional literature the concept of investment diplomacy is used most in the context of negotiations on regulation of investment activity. However, it is infrequently used in comparison to the usage of the terms "commercial diplomacy" (Naray, O., & Bezençon, V. (2017)) and "economic

diplomacy" (Okano-Heijmans, M., & Asano, T. (2018)), to which spheres the diplomatic support of investment activities belongs.

Metods

A combination of methods used for theoretical and empirical research was applied: dialectical and historical methods of scientific knowledge, analysis and synthesis in the study of the genesis of the content and evolution of the development of commercial diplomacy, the systematization of forms and methods of commercial diplomacy; method of systematic analysis in the study of national and regional models; statistical and graphical methods for information processing; separation of its models and formulation of conclusions to sections and general conclusions.

Results

Specificity of commercial diplomacy implies that the diplomat may act as a business promoter, civil servant or generalist, which is mainly due to his subordination to the relevant export promotion agency, the Ministry of Trade (Economy) and the Ministry of Foreign Affairs. The relative importance of ancillary services to which researchers refer the search and analysis of business-related information depends on the willingness of the business to pay for such services. Direct involvement of diplomats in the promotion of business depends on the organizational structure, culture, recruitment system, motivation, control and encouragement. In addition, with increasing involvement, the importance of business experience and effective liaison with the business community of a trade and investment support diplomat is growing.

Commercial diplomacy has undergone significant changes in the course of its development and differs in its manifestations. In the scientific literature the search for determinants and factors that influence certain aspects of commercial diplomacy and determine its specificity is underway.

In our study we have identified the determinants that determine the services of commercial diplomats abroad, namely: the specifics of commercial diplomacy, the peculiarities of the customer, the peculiarities of the country of the diplomat himself, the peculiarities of the country of the diplomat's presence and the global business environment (Fig. 1).

Customer specificity also matters. Companies are often can rely on free services if they meet the criteria set by the state (for example, small and medium-sized enterprises, newcomers, priority sectors, companies willing to enter the international market). Customer willingness to pay determines the availability and range of paid services. When forming a customer base by diplomats recommendations and reliability of companies are essential.

The peculiarity of the country of origin of the diplomat also leaves its traces on his activities. Commercial diplomats from developing countries are more concerned with the image of their own country as a producer of certain products, as well as the image of national business. The better the relationship between the state and business, the more the government is inclined to pay attention to the promotion of business.

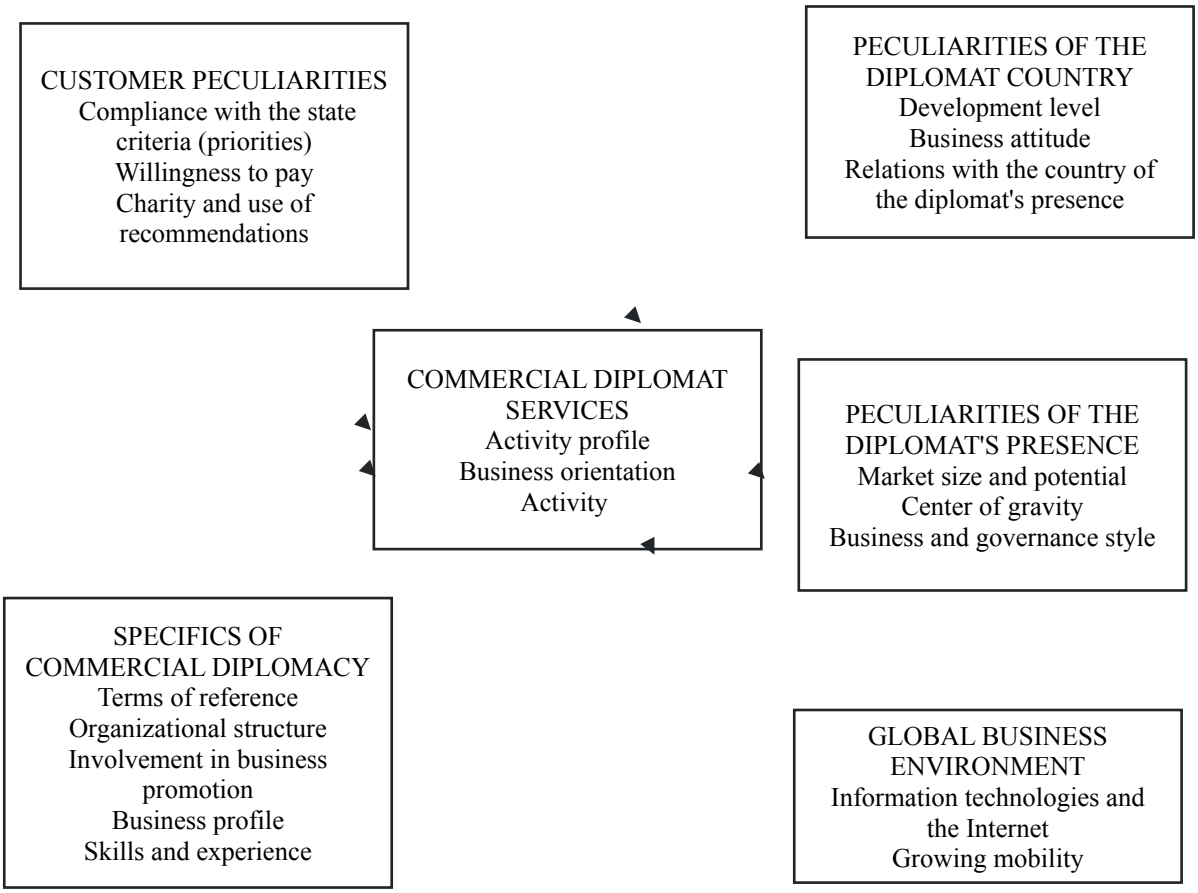

Figure 1. Determinants of commercial diplomat services (original development)

Lack of proper regulation of the rules of the game for business between the country of origin of the diplomat and the country of his presence (for example, in taxation of foreign direct investment, visa regime, etc.) creates additional difficulties for commercial diplomats.

Large and potentially attractive markets make commercial diplomat activities more sophisticated. The relative importance of certain basic services, which are directly related to marketing (facilitating the holding and/or participation in fairs and exhibitions, trade missions, conferences and seminars, promotional made-in campaigns) depends on whether the country is the center of gravity for the activity: banking center, fashion center, specialized cluster of research and development and more. Also, the more similar the business regulatory regimes of the countries of origin and the presence of the diplomat, the less the emphasis in his activities on issues of regulation. Changes in the business environment are driven by the development of information and communication technologies, which access is increasingly push diplomats to focus on providing business support and PR activities.

Trade globalization is manifested by the growing interconnectedness and interdependence of economies through international trade. With increasing exports and foreign trade, countries are becoming more sensitive to changes in international trade trends and are thus relying more on commercial diplomacy to maintain and develop commercial ties.

With the development of the international trade system, the scope of commercial diplomacy, which is involved in trade in goods, services, technology transfer, foreign trade-related investments, as well as environmental and labor-related issues affecting trade, is growing. The skills and experience of diplomats do not always meet the realities and requirements of today dynamic environment, especially when the issues raised are increasingly technical and require constant updating. With such subject complexity, trade globalization stimulates commercial diplomacy to enhance the competence of diplomats. The width of subject coverage of today international trade system requires the involvement of all types of actors. Therefore, diplomats are expected to have a wide network of contacts, be open and flexible in bringing different subjects together around different topics or interests.

Under the influence of the global economic crisis, globalization has received new development vectors and has led to changes in the strategies of development of the international economic system in the medium and long term. Further intensification of competition, which is accompanied by the efforts of major actors of the world economy to redistribute spheres of influence and markets, is carried out. In such circumstances, the importance of national development strategies is growing. They reflect the ability of states to properly assess opportunities and risks and determine how best to act, as well as generate commercial interests that drive the country in international economic relations.

Today to ensure the competitiveness of national economies and businesses is at the heart of many national development strategies. In response to these challenges of time, commercial diplomacy, on the one hand, focuses on implementing such strategies in terms of trade and economic objectives, and on the other hand, on finding mutually acceptable solutions to international economic cooperation that will facilitate the implementation of the national agenda.

Discussion

Global digitalization requires increased efficiency, mobility and transformation of methods from diplomatic systems. One of the first consequences was the significant modernization of the function of information collection by diplomats. Before the appearance of the Internet, diplomats were equally involved in the collection and analysis of information. Now it is inefficient to retain a diplomat abroad for the sole purpose of collecting information, since access to the vast majority of information, from media publications, and telecontent to government official sources and special information, is possible without crossing the border. In such circumstances, the development of the analytical function of commercial diplomacy and prompt response is stimulated.

Improved access to information is felt not only by diplomats, but also by a wide range of other actors who not only consume information from the government, but can use and distribute it themselves. In general, the individualization of contacts is a distinctive feature and a challenge in modern communications. This requires from diplomacy to change the way it communicates with different audiences in order to improve communication efficiency, the ability to adapt to new interests and technologies, and use the latest platforms – specialized websites, social networks, etc.

Digital technologies also promote new forms of representation, including temporary representation, embassies playing the role of hubs. The promtness of communication also requires speeding up the response to an event or a media request.

Conclusions

Commercial diplomacy is a specific field of diplomatic activity, which provides for the use by the state, in cooperation with non-state actors, of diplomatic channels and instruments, both on a bilateral and multilateral basis, to facilitate trade and investment in order to ensure business opportunities of national companies, to remove barriers for trade and investment, to increase competitiveness of the national economy. It partly includes trade and investment diplomacy. It is distinguished from economic diplomacy by the purely commercial nature of the goals, and unlike business diplomacy, it is carried out by the state.

Current trends in the development of commercial diplomacy are increasing the funding for the purpose of commercial diplomacy and developing formal links between government and business, increasing the importance of coordination, increasing the mobility of commercial diplomats across time and space, increasing job requirements and changing working conditions, increasing client-centricity of the work of diplomat abroad, with the active use of new communication instruments to provide information to exporters, increasing the number of information, analytical and other paid services, new multilateral negotiating platforms; increasing the number of local employees in embassies and representative offices advising businesses at the cost of reducing the staff of the country of origin; as well as the increased efforts of government agencies and academic researchers to evaluate the effectiveness of export and investment support.

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JEL Classification: O21, L21

Laura Vorpsi Cami,
PhD (Dr. iur), Lecturer of the International Private Law,
Civil Law Department, Faculty of Law, University of Tirana, Albania
ORCID: https://orcid.org/0000-0002-1908-9151

STRATEGIES FOR THE INTERNATIONALIZATION OF CAR TNCs

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Abstract. *Central to corporate strategies for the internationalization of the financial and economic activities of automotive TNCs are questions about both, the geographical configuration of their international value chain and the degree of its manageability, the effectiveness of management coordination, and the level of integration of the corporate organization structure. Exacerbation of the competition between automakers for raw materials sources and markets generates such a global trend of modernizing corporate strategies for the internationalization of their activities as a modularization of business activity, which underlies the powerful motivation of mega-suppliers of automotive corporations to increase their level of vertical integration production and implementation of macro components. Despite the global nature of automotive manufacturing modularization, each multinational corporation chooses the most appropriate modular platform model in terms of the most efficient combination of organizational structure, operating system of research and development and the level of versatility to maximize adaptation in the production of different models and modifications of vehicles. In the face of global trends, the automotive corporate sector undergoes a significant deepening of integration processes, which is manifested in the formation of branched and highly diversified consolidated groups of companies. This necessitates the growing need to integrate multinational corporations' complex methods of analyzing their financial status into the practice of diagnostics of the activities of multinational corporations with the introduction into the business practice of a system of corporate financial sensitivity sensitization that is unified globally.*

Keywords: *multinational corporation, corporate strategies, modular platform model, international value chain.*

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Introduction

Global trans-nationalization of business activity in the first quarter of the 21st century. not only determines the vector orientation of transformational trends of world economic development, but also establishes a qualitatively new paradigm of international division of labor, first of all on the basis of functional-geographical fragmentation and digital integration of TNC production, evolution of its technological, institutional and management structures, as well as fragmentation of the process of creation to smaller stages and links. The powerful synergistic impact of trans-nationalization processes on the world economic system is the main driving force behind the formation of global contours of international specialization, both in individual countries and entire regions and integration groups, giving rise to profound structural changes in interstate trade, production and investment, financial and monetary relations.

The global financial and economic conditions of TNCs, on the one hand, diversify sources of income generation based on the involvement of foreign resources and contract participants in the production process, and on the other hand, transnational activity on the threatening challenges of financial instability, capable of balancing its optimal proportions development. Systemic qualitative transformations in the nature and driving forces of the development of trans-nationalization processes with the growing role of intra-corporate division of labor and the ever-deeper segmentation of TNCs production process require a new level of theoretical understanding of the diagnostics of their activity in the conditions of financial instability.

The systemic structural transformations of the world economy and the completion of its global format formation are largely conditioned by the fundamental processes of trans-nationalization of business activity. It takes on a concentrated expression in the development of global production networks and value chains, diversified channels of international trade, industrial-investment, financial, scientific-technical and innovative activity. As a result, transnational activity has now become truly global and diversified, covering virtually all national economies and all phases of reproduction of a public product by its subjective, objective, sectoral, regional and institutional dimensions.

Literature review

Theoretical foundations of trans-nationalization and international production of TNCs, analysis of financial and economic activity of multinational corporations and its organization, applied diagnostics of financial state of business structures, financial instability and its factors, transformation of corporate strategies and fragmentation of international TNCs networks, formation of global value chains and anti-crisis management systems multinational corporations are most fully developed by well-known economists.

The evolutionary logic, nature, and driving forces behind the development of the international production of TNCs have been theoretically reflected in the scientific publications of a number of researchers. The point is that different scientists not only base qualitatively different methodological approaches in the study of transnational corporations (Amin, A., & Smith, I. (2017)), but also place emphasis on one or another feature (or several attributes) that qualify the company as transnational and its financial and business operations as cross-border (Aydalot, P., & Keeble, D. (2018)).

In the theoretical discourse of transnational corporations, the approaches of Brumana, GDM (2017) and Chen, H., Zeng, S., Lin, H., & Ma, H. (2017), which explore transnational corporations through the lens of their formation, deserve special attention global value chains. At the same time, the main research interest of these scientists is concentrated in the field of research of corporate strategies for controlling their international production and selection of geographical localization points of individual segments of transnational production.

Of considerable scientific interest are the developments of Dodgson, M. (2018) to substantiate the model of transnational production as a theoretical reflection of the

cross-border flows of information, finance and production resources circulating within global value chains.

In characterizing the theoretical discourse of multinational corporations' research, one cannot ignore the conceptual approaches of Shin, Y., Thai, V.V., Grewal, D., & Kim, Y. (2017). In analyzing the level of multinationalism of TNCs, this scholarly focuses on developing its matrix based on a comprehensive empirical analysis of more than 1000 companies in seven developed countries. On this basis, regional, trans-regional and global systems of international production of transnational corporations are singled out and comprehensively characterized, which gives the scientist an important theoretical and practical importance.

In turn, Liu, Y. (2019) considers that the main feature of any multinational corporation is its orientation to the use of different national markets as a single intra-corporate market. This ensures that the structural components of the transnational manufacturing, investment, management and marketing activities are separated into a single corporate system. Moreover, the result of such convergence is to gain TNCs the maximum competitive advantage in the market and maximize the return of transnational capital from the use of production facilities, management methods, knowledge and innovative technologies concentrated in different countries of the world, as well as coordination of marketing and financial operations.

However, theoretical and methodological principles of diagnostics of TNCs business activity have not been sufficiently investigated in the scientific literature due to the influence of financial instability factors. Modern methods of diagnostics of TNCs activity and assessment of their adequacy to global conditions require comprehensive analysis. In addition, it is extremely relevant today to substantiate the strategic priorities of improving the methods of diagnostics of automobile corporations in the conditions of financial instability. Thus, a comprehensive study of the system of diagnostics of TNCs in the context of financial instability is very important in both theoretical and practical terms, which led to the choice of research topic, its purpose and objectives.

The purpose of this work is to study the theoretical and methodological foundations of diagnostics of TNC business, to characterize modern methods of assessing the financial and economic status of corporate structures and assess their adequacy to global conditions, as well as to substantiate the strategic priorities for improving the diagnostic system of automobile corporations in conditions of financial instability.

Based on the purpose of the study, the following specific tasks were set and solved in the work: to open up competitive disposition of TNCs in the global economy; identify the essential nature of global financial instability and its factors; to find out the role and tasks of diagnostics of TNCs activity in ensuring their international competitiveness; to reveal the features of corporate automotive TNC internationalization strategies and the key challenges of global financial instability; to substantiate methodological approaches to the improvement of methods of diagnostics of corporate structures of the automotive sector.

Metods

The research is based on the use of the principle of unity of theory and practice, forecasting the development of economic processes based on the method of scientific abstraction. The following methods of scientific research of the processes of diagnostics of TNCs activity in the conditions of financial instability were used for achievement of the purpose and the tasks of the dissertation: dialectical method (in identification of the essential nature of financial instability and its factors; as well as investigating the transformational changes of corporate automotive TNCs in the context of globalization); historical and logical method (when studying the factors of competitiveness of multinational corporations in the global economy, generalization of the experience of forecasting their bankruptcy and analysis of the evolutionary development of strategies for the internationalization of TNCs in the automotive sector); system-structural analysis of economic processes and phenomena (in revealing the role and task of diagnostics of TNCs activity in ensuring their international competitiveness, as well as analysis of informal methods of diagnostics of business structures of the corporate sector and the dynamics of the financial state of automobile corporations).

Results

Global conditions of functioning of the automotive industry significantly exacerbate the competition between its operators, defining qualitatively new requirements to ensure their competitiveness based on the criteria of high quality products, its reliability and innovative capacity, as well as competitive pricing and unpretentious product. These processes are based not only on the natural result of global trends in systematic liberalization of trade, investment, manufacturing and financial credit, but also on the objective need to expand existing car manufacturers and search for qualitatively new market segments of their products in order to maximize profits and increase efficiency of financial and economic activity.

Against the backdrop of post-crisis stagnation of consumer markets in developed countries, declining sales of automotive products in their domestic markets, increasing individualization of demand, increasing demands on environmental performance and investment attractiveness of global car manufacturers, the vast majority of them are radically rethinking their existing business paradigm. Against the backdrop of the breakdown of trends in the past decades of "following" consumer demand for the technologies offered by the market and the market absorption of practically the entire volume of automotive production, at the present stage of world economic development, more and more automotive TNCs are becoming increasingly active in corporate financial and economic activities and internationalization of business as the main drivers for the development of logical and organized international chains of business generating added value and increased intra-functional relationships.

This is primarily reflected in the intensification of the processes of capital consolidation of automotive corporations, the formation of their strategic alliances, the accelerated unification and standardization of production processes, and the transition of manufacturers to the implementation of single vehicle production

platforms with a dynamic scaling of their sales markets. In the period 2010-2018 alone, the annual value of mergers and acquisitions of automobile companies increased from $ 24.9 to $ 48.1 billion. The total number from 520 to 883, respectively (Fig. 1), which allowed them to significantly expand their foreign affiliate networks.

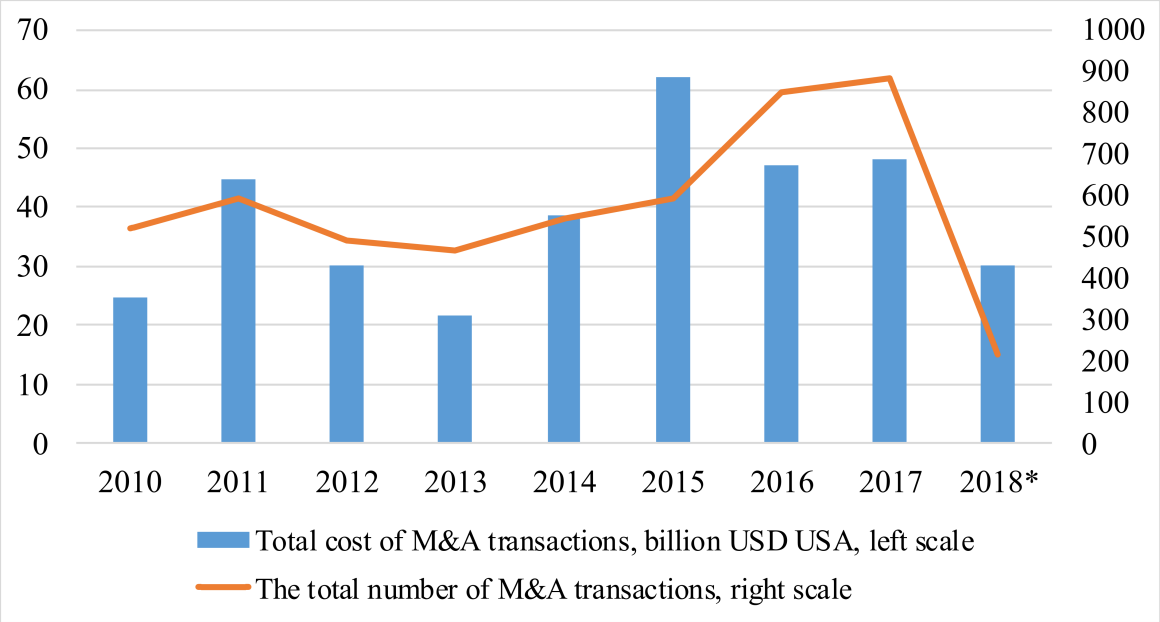

Figure 1. Dynamics of value and number of mergers and acquisitions of automobile companies during 2010-2018, * - data for the first quarter of 2018. (constructed by the authors based on: https://www.pwc.com/us/en/industries/industrial-products/library/automotive-quarterly-deals-insights.html)

Such dynamics testify, first of all, to a significant strengthening of the global trend of capital monopolization of the world automobile industry as the main driver of the processes of concentration and centralization of capital of automobile TNCs, to increase their market competitive positions and to strategically reorient their activity without loss of production capacity. As for strategic alliances, their creation in the global auto industry is dictated mainly by the needs and motives for expanding the product and customer base, combining corporate efforts in the field of joint marketing research and the use of common marketing channels, as well as diversification of market information sources and increase the effectiveness of promotional activities. An example is the alliance of the American car manufacturer Ford with the Japanese Mazda, within which several models of the Ford brand are assembled at the Japanese Mazda plants, and the Mazda models at the European Ford plants. (Palacios, J. J. (2018)).

The implementation of the aforementioned areas of strategic development of automotive TNCs in global conditions becomes possible only on the basis of implementation in their financial and economic activities of strategies of regional internationalization, "focused globalization" and vertical integration with dynamic deepening of cross-border industrial specialization and global search for competitive resources. Such mechanisms allow automotive TNCs not only to increase production

volumes, but also to achieve significant savings of financial resources on the scale of production and innovative developments, significantly reducing the time lag for research and development, intensively using the main area of their specialization and reducing barriers to entry the new segments of national and regional markets.

As shown in the Table 1, the largest contribution to national economic development is now made by the automotive industry of Japan and the United States, where it accounts for 432.6 billion and 425.1 billion euros respectively of total turnover; EUR 66.4 and 64.3 billion in state budget revenues; as well as 725 and 954.2 thousand employees. Automotive supplies about 70% of the value added generated by the industrial sector, generates demand for goods and services in related industries and sectors of the national economy, and multiplies employment, as one worker in the sector creates six jobs in related ones.

Table 1. Key Indicators of the Automotive Industry's Contribution to National Economic Development by Country in 2017 (constructed by the authors based on: https://www.pwc.com/us/en/industries/industrial-products/library/automotive-quarterly-deals-insights.html)

Country	Total turnover, million EUR	Direct investment, million EUR	State budget revenues, million EUR	Employment, thousand people
Japan	435610	6450	66444	725.0
USA	425106	30416	64289	954.2
Germany	227666	11900	44314	773.2
France	111901	4196	34000	304.0
China	86984	5330	…	1605.0

At the same time, the lion's share of the increase in automotive production falls on the Asian mega-region (primarily China, India and Thailand), whose total production from 2000 to 2016 increased from 3 to 34 million units. Instead, in recent decades, car production has declined sharply in countries with high levels of solvent demand. In particular, production in the United States has decreased by 5% since 2000 and by 20% in Canada, respectively.

Similar trends are common in European countries (except Germany) - France, Italy and Japan, and Australia, after 67 years of automotive production, intends to close its last automobile plant, focusing on imports from Thailand and China.

Regarding the strategy of regional internationalization, it includes a set of unique for each region instrumental measures of the corporation to enter the regional markets with coverage of mechanisms and levers of production, marketing and financial activities. In turn, the “focused globalization” strategy aims to increase the competitive position of the firm in the markets of most countries of the world and all regions, with the application of a unified approach to the placement of different value chains.

Finally, the strategy of vertical integration in the financial and economic activities of automobile companies aims at expanding their scope of activities through the merger of supply companies and suppliers of raw materials, semi-finished products with the formation of a vertically integrated system. Being by its very nature

a capital, resource and innovation-friendly type of economic activity, the automotive business has, in the global context of development, received unrivaled opportunities not only to reduce transaction costs efficiently, but also to provide effective optimization of research and development (R&D) costs. Achieving these strategic goals lies in the plane of building a fragmented transnational production based on the network paradigm, which is the result of intensifying the international dispersion of production processes with their fragmentation into small stages and functions.

At the same time, an extensive affiliate network of automotive TNCs forms the material core of enhancing their international competitive advantage and generating special assets through the development of deep and long-term industrial and commercial relationships with local business partners and structural units of their own corporation. A large number of economic agents from different industries and countries are involved in the modern high-tech process of vehicle production.

Choosing the most appropriate corporate strategy for entering foreign markets (export, contract manufacturing, licensing, portfolio investing, forming strategic alliances, joint venture, branch network development, mergers), each automotive TNC takes into account, on the one hand, its geographical diversification - investment, business, marketing and innovation, and secondly, expanding global value chains and increasing efficiency in this way financial and economic activities. It is worth noting, in particular, that there are significant differentiations in dominant corporate strategies for the formation of international value chains, depending on the country of the parent companies of TNCs. While almost 50% of American automotive products are sold domestically, Japanese, Korean, and European companies account for 63% to 84% of total revenues from exporting their products (Someswar, G. M., Dayananda, R. B., Anupama, S., Priyadarshini, J., & Shariff, A. A. (2017)). This indicates a much higher level of internationalization of their activities and export orientation, and therefore a much greater dependence of financial and economic performance on external markets and factors of global financial instability.

When developing corporate strategies for entering foreign markets, automotive TNCs must also take into account its compliance with the economic functions that are planned to be implemented in the medium and long term, which are priorities at this stage of their competitive development.

The current competitive disposition of global automotive corporations in the global market is increasingly determined not so much by their endowment with traditional competitiveness factors (production and labor resources, labor productivity and innovation capacity), but by the structure and nature of the international value chain. It is no coincidence that the central in corporate strategies of internationalization of financial and economic activities of automotive TNCs are questions as to the geographical configuration of their international value chain, and the degree of its manageability, the effectiveness of management coordination, as well as the level of integration of the corporate organization structure.

The key areas of increasing the financial sustainability of corporate structures in the automotive sector in global contexts are also levers and instruments of

organizational, economic and institutional nature. Among them, the following deserve special attention:

First, multinational automotive corporations, with enormous production capacity, require permanent systematic modernization of fixed assets. In this context, it should be noted that the crisis periods of the national business cycles of the host and host countries have always been the most favorable periods for adapting the activities of multinational corporations to changes in the external environment of their functioning and adequate response to global challenges and threats. In such circumstances, the introduction of anti-crisis management systems by multinational corporations makes it possible to respond promptly to any changes in the business environment, restructuring the production and financial systems as quickly as possible. An additional impulse to such restructuring is provided by the system of anti-crisis state support of national corporations, which, according to world experience, always has a powerful effect on the post-crisis "reboot" of national economic systems in a qualitatively new production, scientific, technical, innovative and financial paradigm.

The systematic introduction into the business activities of automotive TNCs in crisis management as a mandatory component of the implementation of mechanisms for its diversification. It is focused on enhancing the ability of TNCs to adapt quickly to the rapidly changing external environment of the business environment, based on the development of such characteristics as incorporation. The latter acquires its concentrated realization in the ability of TNCs' incorporated market relations to ensure an optimal and prompt redistribution of production and financial assets between affiliated companies operating in different host countries, industries and sectors. It is through diversification of activities (including through mergers and acquisitions) that automotive multinational corporations optimize the average rate of return of their operations on the corporate system as a whole, and their subsidiaries experience cyclical and cyclical downturns, to varying degrees of crisis processes for different sectors and sectors of national economies and different countries and regions. At the same time, the diversification of the activities of multinational corporations of the automotive sector in the context of improving its financial stability should be carried out not only by country criterion, but also by types of products, which will also improve the overall results of the implementation of anti-crisis corporate governance strategies. The fact that the overwhelming majority of analytical approaches consider the problem of corporate finance management in the narrow format of corporate governance only, or the problems of public administration, whose bottlenecks do not allow economic agents to solve corporate finance problems independently, should not be discounted. In our opinion, every multinational corporation must necessarily have in its structure a unit for crisis management of financial resources, capable of providing more efficient use of them and significant increase of financial stability. It is no coincidence that today most TNCs qualify sustainable development as a key component of their corporate strategy.

Second, an integral component of improving the diagnostics of automotive TNCs is a comprehensive analysis of its risks in the context of developing and

implementing a comprehensive risk management system. As is known, any multinational corporation in its activities is adversely affected by both the universal risks inherent in all business areas and the specific ones that result from the globalization of international monetary relations. The first group of risks is represented, in particular, by inflation and deflationary risks, liquidity and solvency risks, interest rate and credit risks, risks of diminishing profitability of activity and loss of profit. At the same time, the second group is formed by currency risks - transactional (operational - losses of the corporation from changes in exchange rates and the period between the conclusion of the transaction and payment for it, between the provision of credit resources and repayment of the loan), translation (consolidated - losses in the preparation of consolidated financial statements of TNCs an extensive network of subsidiaries in different countries of the world), economic (negative impact of exchange rates on the indicators of financial and economic activity of a multinational corporation and its market value). Taken together, these risks have a very negative impact on its results, which is reflected not only in the possible significant exchange losses, but also in the negative impact on the value of assets and liabilities of multinationals and their market value.

In view of this, the corporate risk management system can be qualified as a system of corporate management measures aimed at preventing, minimizing or offsetting losses from TNC financial transactions. Thus, currency risk management at the level of a multinational corporation involves first of all solving a key issue - the ratio of centralized and decentralized management powers. In the case of centralization of currency risk hedging functions, all powers in this area should be borne by a specialized unit of a multinational corporation, whereas in the case of decentralization, subsidiaries located in different countries of the world.

The centralized risk management format involves making management decisions based on the analysis of the ratio of long and short currency positions to specific currencies, and therefore - key management decisions in the hedging area associated with the opening of additional currency positions capable of balancing the currency risks of the corporation currencies. It is the centralization of the currency risk management function that saves considerable financial resources on paying commissions for opening additional foreign exchange positions when a specialized unit of a multinational corporation, analyzing the whole spectrum of currency risks of its subsidiaries, assesses the degree of impact of each of them on the aggregate currency risk of TNCs. This ensures the currency hedge of the overall corporate activity in the unity of all its structural units. In addition to the currency hedging in the practice of automotive TNCs, insurance of export contracts in the context of a downward trend of the currency of payment and import - with a tendency to increase it has a significant economic effect. In the context of enhancing the financial sustainability of automotive TNCs, quite promising prospects are also associated with the implementation of hedging practices when a certain threshold is reached at the exchange rate.

Third, the significant leverage for enhancing the financial sustainability of multinationals in the automotive sector is to significantly expand the practice of managing long-term assets through capital budgeting mechanisms. The latter provide

for TNCs' activities to optimize the process of transformation of the corporation's liabilities (materialized in the authorized capital and attracted resources) into highly efficient assets in the form of investments based on the choice of such a way of using available resources that can maximize the benefits of using resources for shareholders.

Thus, the achievement of the strategic goal of improving the efficiency of capital budgeting mechanisms involves the active activity of corporate management in search of promising investment projects, regular assessment of market prospects of specific products, monitoring of production and technical capabilities of corporations, diagnostics of financial indicators and indicators of investment projects and related realization of financial markets, followed by the choice of the most attractive and safe ways of using capital resources. It should be borne in mind that the greatest economic impact from the implementation of these areas will have the consolidation of their implementation by the parent companies of multinational corporations. They are able to take into account in the corporate strategy a wide range of specific factors that determine the efficiency of realization of economic interests of TNCs, namely: differences in national tax systems of different countries, operating restrictions on income repatriation, permanent changes in exchange rates, etc.

Fourth, improving the cash flow management system of TNCs' assets and liabilities is an integral component of enhancing the financial sustainability of multinational automotive corporations in the global context of their operation. Its strategic goals are related to the prevention of corporate insolvency, the control of the company's liquidity, ensuring a steady flow of resources and planned expenses, as well as the intra-corporate redistribution of cash resources and optimizing the profitability of short-term money. Thus, the specifics of TNCs 'cash flow management mechanisms are primarily related to their parent companies' policies on cash consolidation, exchange rate dynamics, and netting in intra-corporate payments. It includes a set of measures to analyze the current financial status of TNCs according to the financial statements, prospective cash planning, with the development of a detailed estimate of their input and output flows.

At the same time, the system of management of short-term corporate liabilities is focused on optimization of the structure of short-term borrowings of TNCs, ensuring the proper level of their liquidity and solvency, maneuvering of corporate resources to minimize interest payments, uninterrupted financing of the seasonal needs of corporations in cash and interest rates, interest payments on loans. In the set of measures to achieve these strategic goals, the key role is played by instruments of accelerating payments, minimizing the costs of foreign exchange transactions, regulating settlements between subsidiaries, creating unified payment centers in TNCs' organizational structures. In particular, in the event of consolidation of temporarily free cash resources, they are redistributed centrally amongst TNC's subsidiaries, ensuring an adequate level of liquidity. At the same time, dividend payments to subsidiaries in favor of the parent company at predetermined periods allow them to ensure proper financial planning of the input and output financial flows, while avoiding cash gaps.

It should be noted that the greatest economic effect is the simultaneous combination of corporate-wide centralization by parent companies of functional powers for cash flow management (at the level of strategic and tactical management of corporate capital) with decentralization at the level of subsidiaries of management decision-making in the sphere of financial management. This involves operating within the parent company structure of a centralized financial center, which makes key management decisions in the field of long-term investment design and lending, internal and external financing of business operations, accumulation and redistribution of temporarily free cash, maintaining liquidity and minimizing capitalization. In their turn, the latter should have financial services involved in the development and implementation of business budgets, financial analysis of the effectiveness of business operations, as well as optimization of taxation of subsidiaries in host countries.

In the context of enhancing the financial sustainability of automotive TNCs, it is critical to identify and evaluate those cash flows that are not directly reflected in the financial statements, and therefore are very difficult to formalize and evaluate. To overcome this widespread gap, it has received technical approval to determine corporate profit before interest, but after tax (EBIAT - Earning Before Interests After Tax) and cash flow from major post-tax business transactions (CFLOAT – Cash Flow From Operation After Tax). With respect to the EBIAT, reflecting the degree of correlation between corporate profit and cash flow from core business operations, it enables a comparative analysis of the financial soundness of companies with different financial structures. At the same time, CFLOAT reflects cash flow with interest payments included and tax payments excluded, and therefore exceeds EBIAT by the amount of adjustments taken into account in the indirect cash flow statement.

In addition, in order to adequately assess the effectiveness of the corporate cash flow management system, it is necessary to use a scorecard that includes:

indexation ratio as the ratio of the absolute amount of operating cash flow to the amount of sales revenue;

cash value index as the ratio of the amount of operating cash flow generated to the sum of the corporation's operating needs in cash;

the duration of the financial cycle and its individual components; - monetary assessment of the value of the cash gap;

free cash flow on invested capital and free cash flow on equity as a basis for calculating the market value of the company.

Fifth, the presence of an extensive network of foreign automotive TNC manufacturing units gives them many opportunities to use such a tool for increasing financial stability as currency speculation. Their mechanism is to redeploy temporarily free financial resources between subsidiaries located in different countries of the world during periods of the most favorable exchange rate ratios. TNCs may derive additional economic benefits from the difference in interest rates and inflation rates of the parent and subsidiary countries. In this case, the scheme of intra-corporate transfers of capital acquires forms of internal lending for obtaining foreign exchange profits by the method of direct capital transfer, transfer of dividend

payments, payment for services rendered or licensing, transfer pricing in intra-corporate trade, intra-corporate or corporate.

Strategic development of multinational corporations in a global environment is characterized by a significant intensification of inter-firm competition, the formation of qualitatively new requirements for ensuring their competitiveness on the basis of criteria of high quality of products, its reliability and innovative capacity, as well as competitive pricing and steady product diversification. The realization of the above-mentioned directions becomes possible only based on implementation in their financial and economic activity of the network paradigm of fragmented transnational production as a natural result of strengthening of the international dispersion of production processes with their grinding into small stages and functions. As the economic, organizational, financial, credit and scientific and technical resources of segmented transnational production increase, the quantitative structure of global value chains as a reflection of the deepening of intra-corporate and inter-firm division of labor in the automotive industry, which is a significant driver for the formation of the established competitive advantages of those auto companies that were among the first to start using this form of production organization.

Choosing the most appropriate corporate strategy for entering foreign markets, each automotive TNC takes into account, on the one hand, the geographical diversification of its production, investment, commercial, sales and innovation activities, and on the other - the expansion of global chains of value generation and enhancing value added method of efficiency of financial and economic activity. Their current competitive position in the global market is increasingly determined not so much by the traditional competitiveness factors, but by the structure and nature of the international value chain organization.

Central to corporate strategies for the internationalization of the financial and economic geographical configuration of their international value chain, as well as the degree of its manageability, the effectiveness of management coordination, and the level of integration of the overall corporate organizational structure.

The intensification of the competition between automakers for raw material sources and markets has created such a global trend of modernizing corporate strategies for the internationalization of their activities as modulating business activity. It is at the heart of the powerful motivation of mega-suppliers of automobile corporations to increase their vertical integration in order to increase the efficiency of the overall chain of development, production and sale of macro components. Despite the global nature of automotive manufacturing modularization, each multinational corporation chooses the most appropriate modular platform model in terms of the most efficient combination of organizational structure, current R&D system, and versatility to adapt to the production of different car models and modifications.

The combined economic impact of the global value chain within the automotive industry is reflected in the development of an extensive transnational system of close interaction of car manufacturers with each other and with customers based on Internet links, traditional and innovative advertising and telemarketing channels, with full technical information performance characteristics of car brands, conditions of their purchase and after-sales service. The key to successful

development of transnational corporations in the automotive sector is the widespread use of information technology capable of significantly improving the efficiency of business management and the continuous exchange of information by public and internal sources of information.

The main mechanism for securing the established competitive advantages of automobile corporations in the global market is their financial soundness, which can only be assessed on the basis of multicriteria and multiple methods of analysis of liquidity indicators and capital structure, profitability and operational activity of automobile TNCs. In today's diagnostics of automotive TNCs, analytical and methodological approaches should be as synchronized and harmonized as possible, and all symptomatic indicators of corporate financial stability assessment should be integrated into a single analytical system. Only in this way is it possible to detect the first signs of financial instability in a timely manner and prevent it through the implementation of proactive management in operations, profitability and asset management. All analytical and diagnostic indicators are closely functionally interdependent, which requires their systematic analysis in dynamics and with development of perspective forecasts of their change in the short, medium and long term. Almost all automobile corporations were more or less destructive of the global economic crisis of 2007-2010, with well-defined country and regional performance parameters. This requires a thorough rethinking of methodological and methodological approaches to the diagnostics of multinational corporations, primarily based on the obligatory consideration of factors of global financial instability in the calculation of current indicators of financial dynamics and its forecasting.

While the US and European car giants have a significant lack of working capital, the Japanese and Korean are characterized by relative financial sustainability and have sufficient own working capital to operate effectively. Asian multinational corporations in the automotive sector are also characterized by relatively higher rates of return on assets and equity, as well as profitability and asset turnover. It was during the global economic crisis that Asian automotive TNCs laid a strong foundation for future dynamic growth, based primarily on maximizing the environmental determinant in the formation of solvent global demand for its products and the factor of price reductions due to the advent of new car manufacturers Chinese and Indian), with significantly lower production costs.

Systematic greening of global economic development causes a significant increase in the requirements for the safety of car operation, energy savings and counteracting global warming, causing the urgent need for the implementation of giants by the corporations-giants of the concept of environmental marketing with the implementation of diversified environmental protection and environmental protection.

The modernization of automotive TNCs marketing strategies is also linked to the dynamic processes of saturation of consumer markets, the global crisis of overproduction and the decline in overall macroeconomic growth in the leading countries.

However, even the global conditions of their operation are not able to undermine the uniqueness and specificity of consumer characteristics of regional and

national automotive markets. Each segment is characterized by its own car performance requirements, so even the integration of multinational car corporations is not able to fully unify key consumer demand parameters in key regional segments of the global automotive market.

In the face of global trends, the automotive corporate sector is undergoing a significant deepening of integration processes, which is manifested in the formation of branched and highly diversified consolidated groups of companies, due to the growing need for the implementation of complex methods of analysis of their financial corporations in the practice of diagnostics of transnational corporations. The widespread use of competitive advantages of global financial and economic activity and international commercial operations provides automotive TNCs with the established resilience of their corporate production systems to crisis phenomena and processes in national and global economic systems. At the corporate structure level, this is achieved primarily through the implementation of a transfer mechanism to compensate for losses received by structural units of corporations in one country, and the profits of units located in other countries.

Discussion

The enormous scale of the activities of automobile corporations with their strong competitive disposition in key regional segments of the global market gives rise to such a tendency as the systematic trans-nationalization of diagnostics of their financial and economic activity. It manifests itself in the introduction into business practice of a globally unified system of sensitive diagnostics of financial soundness of corporations and includes methods, techniques and tools for analyzing their activities. As a result, the main goal is to evaluate the competitive status of TNCs in the global automotive market and the level of their financial sustainability from a single methodological standpoint. In today's diagnostics of the activities of automotive TNCs, analytical and methodological approaches should be synchronized as much as possible, bringing to a single methodological basis all the symptomatic indicators of assessing the financial soundness of corporations and integrating them into a single analytical system. Only in this way is it possible to detect the first signs of financial instability in a timely manner and prevent it by implementing proactive management measures.

Comprehensive diagnostics of the activities of transnational corporations of the automotive sector should be based on the modeling of the analytical process, which reflects the logical sequence of stages of analytical work, includes an appropriate list of diagnostic indicators and indicators, a complete set of analytical, information, statistical and factual data; and also contains an algorithm for calculating indicators in accordance with each area of diagnostic and analytical work. Such logic and stage of carrying out analytical process on diagnostics of financial and economic activity is capable to provide the management apparatus of the corporation, its internal and external stakeholders and all other interest groups with all objective information about the current state of financial stability of the corporation and its prospective trends in order to develop appropriate solutions in the field of operational and strategic management.

Conclusions

To sum up, we note that today's corporate automotive TNC strategies are based on a fundamental reorganization of the geographical configuration of the global value chain, taking into account the key trends in the development of regional automotive markets. The significant intensification of competition between leading TNCs over the redistribution of global economic power increasingly drives them to reduce transaction costs of production while improving the quality, innovative capacity and environmental friendliness of auto production. This is best achieved through the implementation of the modular manufacturing paradigm in economic practice, which significantly increases the economic efficiency of manufacturing, design and innovation processes in the automotive sector, as well as provides significant savings on the scale of production and procurement of standard modular elements, units and nodes. In addition, the introduction of a single modular platform in the production process with a new scalable product line design underpins the creation of new car models in different segments on a single modular platform. This has a natural consequence of a radical reorganization of the internal production organization of automotive TNCs, first in the part of their development of their international production networks.

At the same time, the strategic orientation of carmakers to achieve the effect of economizing on the scale of production motivates them to the introduction of standardization of a certain range of units of different brands of cars based on deepening inter-company production cooperation, the implementation of competitive formats of cooperation and vertical integration of automotive components.

Summarizing the above, it should be emphasized that the ability of multinational corporations of the automotive sector to form an extensive network economic model of production and distribution relations allows to effectively integrating national economic systems into the modern system of production and market circulation of goods, scientific and technical and innovative workforce. . In such circumstances, the modern perception of the competitiveness of national economies is based on the objective need to implement in economic practice incentive mechanisms to support the financial and economic activities of TNCs as a key driver of diversification of the economies of countries based on systematic processes of their trans-nationalization.

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Anton Zhuchkov,
PhD student
University of the State Fiscal Service of Ukraine, Irpin, Ukraine
ORCID: https://orcid.org/0000-0002-7803-162X

Pavlo Pashko,
Doctor in Economics, Professor, Department of the Customs Business,
University of the State Fiscal Service of Ukraine, Irpin, Ukraine
ORCID: https://orcid.org/0000-0002-2697-751X

RELIABILITY OF UNDERINVOICING REVEALING METHODS: CASE STUDY UKRAINE

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Abstract. *Goods mispricing in international trade is regarded as customs fraud according to the WCO typology and reveals itself as a great challenge for customs and tax bodies all over the world. Revenue losses, tax avoidance, mispricing and other types of fraud create significant obstacles in the development of the social sphere, especially in the government programs implementing, which in the long run has a very negative impact on the investment climate and the development of national economies in general. Empirical data are examined to estimate accuracy and reliability of certain methods of statistical analysis in the context of targeted control enhancing. The benefits of multistage approach are shown, which can be used to reveal possible violations of customs law and prevent significant under-invoicing of imported goods.*

The objective of this research is to study the basic features of the most widely applied methods of abnormal pricing estimation and to examine a possibility to combine two mainly applied approaches to enhance robustness of the obtained data and credibility of the analysis results. An attempt is made to define basic efficient tool which could be used by customs authorities for further development of customs value control strategy.

To accomplish the research task, general scientific methods are applied, such as inductive logic, comparative and statistical analysis as well as generalisation.

The main points of widely applied mirror data analysis and price filter method are examined focusing special attention on the shortcomings and ways to diminish possible mistakes. Crucial role of appropriate statistical data and other available information using is shown to reveal potential underinvoicing, tax avoidance and other fraudulent trade activities. Possibilities of the two-staged statistical analysis of customs value indices as risks-oriented mechanism in national customs valuation database are investigated. The calculated figures show noticeable discrepancies in customs values declared at export and import. The paper identifies advantages of multistage analysis of available trade statistics data to facilitate the customs valuation control targeting and further process automation.

Keywords: *customs value, abnormal price, price filter method, mirror trade statistics.*

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Introduction

The most negative effects of this phenomenon are a significant reduction in budget revenues, corruption and shadowing of the economy at the macroeconomic

and national levels, noticeable complications for legal business because of the implementing of additional burdensome control measures and distortion of the competitive market environment. In a broader sense, this creates significant obstacles in the development of the social sphere, especially in the government programs implementing, which in the long run has a very negative impact on the investment climate and the development of national economies in general.

Literature review

The problem of misinvoicing was considered from different points of view by many researchers among them: Carton, C. & Slim, S. (2018); Hien, T. (2017); Lemi, A. (2019) both in the context of studying best ways to assess trade data discrepancies, as well as the causes and conditions of this phenomenon. Much of research has been conducted in the framework of the fight against Illicit Financial Flows (hereinafter – IFF). Despite some concerns about a uniform definition of the IFF, the scope of the term covers the core concept of cross-border movement of capital associated with illegal activities. M. Forstater denotes narrow definition of illicit financial flows as "a range of activities including hiding the proceeds of crime, drug trafficking, and embezzlement; channeling funds towards criminal destinations, such as bribery or terrorism; misreporting transactions in order to evade tariffs or taxes; and capital flight in disobedience with currency controls" (Volpato & Rajan, 2019).

Despite a number of shortcomings, which will be discussed below, many researchers use mirror statistics data of different levels of disaggregation (Hiding in Plain Sight, 2014). In order to avoid possible misunderstanding or wrong conclusions when using mirror analysis and enhance robustness, the price filter method is widely used recently. Most empirical research, therefore, focuses on finding the optimal means to determine asymmetry in the trade balance and discrepancies in trade statistics, as well as ways to estimate the amount of lost income.

Such studies have been conducted in the last two decades, using data from various countries in Europe, Asia and Africa, as well as the United States, mainly to study the problem of capital illicit outflow from developing countries and illegal money laundering by over-and under-estimating the value of goods. In-depth analysis of trade data discrepancies and lost income estimates, based on trade statistics of Hungary, Montenegro, Ghana, ASEAN countries, Switzerland revealed not only gaps in reported information which need to be further explained but also a lot of features of this method applying, such as different approaches to main results interpretation Cobham, A. & Janský, P. (2020).

Metods

The most large-scale researches in this area were conducted by experts from Global Financial Integrity (hereinafter - GFI), an international non-governmental organization focused on combating IFF, corruption, illicit trade and money laundering. The information presented in the GFI reports refers to generalized and detailed indicators of foreign bilateral trade between and among 135 developing countries and 36 advanced economies showing IFFs estimates, mismatches in trade data (Bilateral Trade Asymmetries, 2018).

Results

GFI experts examine data submitted by governments each year to the United Nations COMTRADE database using a partner-country analysis to compare and contrast the differences between any set of two countries in order to help identify the countries "most likely at risk for trade misinvoicing (and therefore, significant government revenue losses), and to recommend policy measures to combat trade misinvoicing to customs authorities in-country and those of their major trading partners" (The magnitude of trade misinvoicing in Ghana and Hungary, 2021). According to GFI's definition, "trade misinvoicing is the act of the deliberate manipulation of the value of a trade transaction by falsifying, among others, the price, quantity, quality, and/or country of origin of a good or service by at least one party to the transaction" (Mirror Analysis Summary Report, 2015).

In GFI study by Kar, D. & Spanjers, J. (2014) the following figures calculated for the period 2002-2011 according to the GFI methodology applying mirror analysis of trade statistics were announced (Table 1).

Table 1. Illicit Financial Flows from Developing Countries: Current (2013) and Previous (2012) Estimates, (billions of US dollars)*

Research year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
2013	270,3	301,5	384,5	498,9	511,4	594,0	789,5	770,3	832,4	946,7
2012	299,8	359,0	490,0	615,1	588,7	669,9	871,3	776,0	858,8	

**as defined by GFI (Mirror Analysis Summary Report, 2015)*

The sum of the value gaps identified in trade between 135 developing countries and 36 advanced economies over the ten-year period 2002-2011 was estimated at $5.9 trillion. The sum of the value gaps identified in trade between 135 developing countries and 36 advanced economies over the next period 2008-2017 heightened to $8.7 trillion. The following findings were shown in the GFI Report published in 2020 (Table 2).

Table 2. Illicit Financial Flows from Developing Countries: 2018 Estimates, (billions of US dollars)*

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Sum of All Value Gaps	841.4	643.6	824.7	994.1	944.4	1040.9	973	804.8	850.3	817.6

**as defined by GFI (Mirror Analysis Summary Report, 2015)*

The key indicators of the GFI study, on the one hand, draw the necessary attention to the problem of illegal cross-border capital movements as one of the most destructive economic problems, but on the other hand, raise some doubts about the approaches used. Well-known economists (Nitsch, 2010; Nitsch, 2017; Forstater, 2018; Cobham & Janský, 2020), analyzing these data, made a number of critical remarks about the reliability of certain indicators and the reliability of the use of this

technique which are crucial to get down to the core and optimize the idea to use the approach for customs valuation control targeting (Hien & Hung, 2020; Tandon & Rao, 2017; Musliu et. al., 2015).

Pointing out the shortcomings of the methodology used by GFI experts (Nitsch, 2010; Nitsch, 2017) notes that any analysis of generalized trade data gives insufficiently reliable results and there is a danger of arbitrary implicit assumptions that negatively affect the objectivity of the study and also can lead to confusing conclusions (Cathey, et. al., 2017; Grondona, 2018). The implicit assertion that inaccurate declaring or even deliberate misinvoicing occurs in only one of the partner countries and that the submission of data by the other one is always correct lets the defined value gap to be attributed to illicit activities or even violations. But this assumption is not correct, because there are many objective reasons for discrepancies in the trade balance, such as trading systems, the coverage of goods by general statistics (for example, military goods, supplies, small in volume or weight, re-export, return of goods after repair, etc.), time of entering data into the statistical database, application of rules of origin of goods, unknown country of final destination, etc.

The choice of trading partner countries to compare figures of trade only between advanced economies and developing countries also arouses a great deal of critical comments. The approach to attribute trade data discrepancies or even calculated value gaps directly to the most common way of capital outflow can't be regarded to be robust enough to draw appropriate conclusions.

That's why many researches (Cobham & Janský, 2020; Forstater, 2018; Nitsch, 2017) argue that such facts actually require a thorough analysis in each case. Actual estimates of real trade mispricing should be detected only at transaction level

Cobham define trade mispricing as process which "occurs when transactions between both related and unrelated parties are mispriced to avoid tariffs, taxes or achieve similar, illicit or other, objectives (in contrast to a more narrowly defined transfer mispricing that describes only transactions between related parties within a multinational corporation)" (Cobham & Janský, 2020). Cobham and Jansky summarize that trade mispricing enables shifting income or profits out of countries mainly either through import over-invoicing or export under-invoicing, although there are some plausible motivations for import under-invoicing or import over-invoicing" (Cobham & Janský, 2020). Regarding the problem of misinvoicing in Ukraine the attention should be drawn to the fact, that fraudulent invoices submitted for customs clearance mostly demonstrate prices of goods less than the prices actually paid. It is mainly aimed to reduce tax base as well as evade customs duties in certain cases (Volpato & Rajan, 2019).

So, as it is stated above, actual amount of misinvoicing cases can be detected only by comparing export and import data at the most detailed transaction level.

Framing good points of proper criticism of mirror data analysis many recent studies have shown that the direct use of mirror data is possible only under appropriate conditions, such as additional analysis of conditions and means of transport, time intervals and delivery conditions, mandatory comparison of applicable customs regimes and trade system types, national features of collection and

dissemination of statistical data, different data sources, than the database of customs declarations.

At the same time, econometric analysis, mathematical modelling and forecasting require numerical data. The possibilities to use national customs declaration databases for comparison are usually limited for researches. Therefore, generalized statistics presented in open on the web databases resources of the International Monetary Fund (Directorate of Trade Statistics) and the United Nations (COMTRADE) is used for analysis.

The use of open resources in this sense has its strengths and weaknesses. The creation and maintenance of statistical databases by the World Bank, the UN and the International Monetary Fund allows conducting analysis of various types, taking into account differences in data collection methodology, sources and frequency of information collection and dissemination, etc. At the same time constant monitoring of information relevance is required to ensure the necessary robustness and reliable results. The list of is caveats is significant, so the use of statistical information for objective conclusions is optimal mainly within the framework of a risk-oriented approach. The best way to ensure the appropriate use of certain trade data indicators is to develop and implement the national valuation database in accordance with the risk assessment and management procedures set out in the WCO Risk Management System Guidelines and Revenue Package measures.

Control over the appropriate customs value declaring is an integral part of measures aimed to ensure the financial security of the state. The most difficulties in this area in Ukraine are currently associated with difficulties in obtaining and automated application of price information. The control optimization strategy must include the use of all available data analysis methods for forecasting, comprehensive analysis of risk factors, creation of regional trade models, etc. The use of generally accepted analysis technics will help to maintain the most effective methods of customs control provided that radical changes are made in approaches to customs risks profiling and post-audit control (Zhuchkov, 2021).

Deliberately inappropriate (or even fraudulent) declaring of customs value of goods is possible in international trade both between unrelated trade partners (misinvoicing) and between related partners, such as branches of multinational corporations (transfer mispricing), for example by setting a contract price for tax evasion or its minimization). This makes it very difficult to detect truly fraudulent schemes, so the analysis of bilateral trade statistics should be conducted at several levels, in their logical sequence, providing the maximum possible detail of the object of study: comparative analysis of statistics, study of relevant price information, analysis of individual foreign trade transactions.

In a broad sense, the method allows to determine the normality or abnormality of individual prices in accordance with the arm's length principle, general trends in world trade, as well as transparent market prices. The central idea of this approach is applying the most detailed statistical information, which offers data regarding trade volumes and prices for individual categories of goods and enables establishing a range of normal (fair) prices for each category. Most studies typically use the interquartile range of values as a kind of benchmark to determine whether a price is

normal or not, defining values outside of this range as abnormal (Zhuchkov, 2020; Patnaik, et.al. 2010). Establishing a range of acceptable values is a common practice in benchmarking analysis.

It should be mentioned that this approach complies with the understanding of the main concept of arm length' principle in the sense of transfer pricing but how it is applied practically may vary from country to country. Narrowing the range with statistical tools, such as, for example, the interquartile range is common practice as well (Hong, et.al., 2014). The interquartile range is defined as the middle part of the data range, i.e. the data points found between the first and third quartiles. The use of statistical methods is mentioned in the OECD Transfer Pricing Guidelines 2017 pointing out that statistical tools that take account of central tendency to narrow the range (e.g. the interquartile range or other percentiles) might help to enhance the reliability of the analysis, if the range includes a sizeable number of observations (Musselli & Bürgi Bonanomi, 2018). Thus, in the data set, containing prices per unit of the product, the average 50% of all observed prices are considered normal. So, in corresponding studies the interquartile range of an array of customs values of goods at import/export obtained from monthly statistics were used for comparison as the free market price wasn't available.

The next step to provide more transparent criteria to compare the customs value of goods was the study performed by Hong, et.al., 2014. They examined fresh banana customs values obtained from the US Department of Commerce's import database and compared with the free market price determined and published monthly by the UN Statistics Division (Misinvoicing Analysis in ASEAN-China Free Trade Aggrement, 2018). In 2018 Musselli & Bürgi Bonanomi, 2018 as well as used the price filter method to detect abnormal prices for goods imported into Switzerland. The price ranges were defined for certain categories of commodities disaggregated at HS subheading level based and then compared with their current price on the free market, such as stock prices (London Metals Exchange, London Bullion Market Association) and information from international non-governmental organizations (The International Cocoa Organization, International Coffee Organization).

Actual free market price of commodity is more preferable as a benchmark for arm's length price than values relying on interquartile range, which is known to be problematic.

Such approach is quite close to applying the so-called "sixth method" of transfer pricing analysis, introduced in Latin America, which differs from the CUP method used to compare the price charged for property or services transferred in a comparable uncontrolled transaction in comparable circumstances. The sixth method allows comparisons with market (exchange) quotations, instead of comparisons with agreements and prices agreed between unrelated parties (The magnitude of trade misinvoicing in Ghana and Hungary, 2021).

It should be noted that the price filter method has also been criticized a lot, mainly because this approach reflects the hypothetical assumption that unit values for a particular category of commodities should change only in a relatively narrow range, while there are no objective criteria for determining normality of price. Significant discrepancies in trade data may be partly explained by objective assumptions or facts,

but this does not explain the scale of the problem. This research is an attempt to apply both trade data mirror analysis and price filter method to identify possible abnormal values, f.i. a data set comprising prices per unit. Indicators can be used as one of the criteria for a risk management system.

This study is aimed to examine the level of customs value for certain groups of cut flowers at export from top exporting countries and at import into Ukraine also comparing with appropriate mirror data submitted by some other countries during 2016-2019. The statistical information presented on the UN COMTRADE website was used to calculate customs values at export for each subgroup of goods on the monthly basis, and accordingly, the mirror import by partner countries.

The maximum possible level of goods disaggregation was selected for this study. For a more accurate comparison the commodity was subdivided according to their tariff classification and destination. The following HS subheadings are chosen for research: 060311 - “roses”, 060312 - “carnations”, 060313 - “orchids”, 060314 - “chrysanthemums”, 060315 - “lilies”, 060319 - “other flowers”.

In terms of flower exports in 2016, the Netherlands ranked first, covering more than 50% of the world market (total export value - $ 4.08 billion). The next three places in the ranking were occupied by Colombia ($ 1.31 billion or 16.2%), Ecuador ($ 797 million or 9.8%) and Kenya ($ 537 million or 6.6%). During the period chosen for the research, the figures did not change significantly: the total value of flower exports from the Netherlands in 2019 amounted to $ 4.08 billion (45.7% of the market), from Colombia - $ 1.47 billion (16.5%), from Ecuador – $ 881 million (9.8%), from Kenya - $ 616 million (6.9%) (Mirror Analysis Summary Report, 2015).

Besides Ukraine, Belarus, Great Britain, and Germany were selected to provide a thorough comparative analysis and parallel trade statistics mirror data. Differences in the requirements of national legislation, the cost of transportation, national trade policy and the peculiarities of the functioning of the flower market provide the necessary level of evidence to make an assumption concerning the “normality” or “abnormality” of prices declared at import.

The data set contains average values per 1 kg of fresh cut flowers (in USD), calculated of trade value and net weight indices submitted by exporting countries on monthly basis (Netherlands, Colombia, Ecuador, Kenya) as well as mirror import data of Ukraine, Belarus, Great Britain and Germany for the period from January 2016 to December 2019. Customs values at export and import were compared taking into account transport costs on the terms FOB export and CIF import.

It should be mentioned that values were compared only if data from both partners were submitted. In case of misclassification i.e. if information from only one party was available, such data were not taken into account.

The average customs values of certain flowers falling in HS subheadings 060311, 060312, 060314 and 060319 exported from the Netherlands, Columbia, Ecuador and Kenya depending on their destination of import are shown in Table 3.

Table 3. Exported from the Netherlands, Columbia, Ecuador and Kenya

	UKRAINE		GREAT BRITAIN		BELARUS		GERMANY	
HS code	Customs Value, $/kg import cif	Customs Value, $/kg export fob	Customs Value, $/kg import cif	Customs Value, $/kg export fob	Customs Value, $/kg import cif	Customs Value, $/kg export fob	Customs Value, $/kg import cif	Customs Value, $/kg export fob
COLUMBIA								
060311	1,24	5,64	9,68	6,47	8,69	5,62	7,95	6,26
060312	1,59	4,70	6,98	5,50	6,66	8,24	6,81	5,61
060314	1,91	10,05	3,74	2,90	5,82	8,31	10,21	3,97
060315	n/a	n/a	4,70	9,60	6,44	2,38	n/a	n/a
060319	2,24	2,99	6,11	4,60	5,88	6,49	6,84	4,40
ECUADOR								
060311	1,07	4,93	8,23	5,81	7,11	5,27	8,91	5,50
060312	1,43	4,19	9,91	4,93	6,36	4,23	6,68	4,52
060314	1,25	4,24	9,83	6,75	5,73	1,98	6,38	5,61
060315	n/a	n/a	n/a	n/a	n/a	n/a	7,95	9,10
060319	1,33	5,46	9,32	5,50	5,75	5,82	8,54	5,66
KENYA								
060311	1,95	5,06	5,92	4,86	7,60	4,34	5,27	4,63
060312	2,87	5,62	5,85	3,42	n/a	n/a	7,16	4,92
060314	n/a	n/a	7,34	3,71	5,46	3,33	7,66	3,76
060315	n/a	n/a	7,71	5,32	n/a	n/a	4,85	4,79
060319	3,87	4,58	8,47	4,06	6,02	3,82	7,32	4,03
NETHERLANDS								
060311	1,22	5,97	8,46	7,66	13,40	8,95	7,32	6,49
060312	1,54	8,71	5,31	6,00	9,86	10,16	6,46	8,03
060313	1,51	11,64	4,36	18,01	19,18	21,19	20,13	21,76
060314	0,79	3,40	7,52	5,23	7,85	5,63	6,54	6,57
060315	1,43	10,64	8,83	12,26	8,17	17,08	8,28	8,98
060319	1,47	6,47	6,45	6,65	9,90	7,41	6,72	8,23

Levels of customs value (reported on FOB basis) at export from the above countries into Ukraine and some other countries are comparable and the average figures are approximately in the same range. Trade value at import is reported on CIF basis. To attain the CIF value, freight and insurance costs between the ports of loading and destination are added to FOB price. The estimation of transport costs depends on many economic factors, and according to different methodologies, it is in a quite broad range. It is not the question of this study, but there is no doubt, that CIF value cannot be lower than FOB, under normal circumstances of trade, excepting specific cases. For example, average customs value at import to Great Britain is 12.1 % more, than customs value declared at export/customs value at import to Belarus is 11.9% more and for Germany it makes 19%. But it is not the case for Ukraine. Customs value at import to Ukraine from the same exporting countries in the same period differs significantly. The average customs value at import is 3.6 times or 72.5% less than the corresponding FOB value at export (Table 4).

Table 4. Customs value at import to Ukraine

Exporting partner countries	Average customs value per 1 kg at import to Ukraine (CIF)	Average customs value per 1 kg at export (FOB)
Average 2016	1,60	5,04
Colombia	1,50	4,57
Ecuador	1,45	4,52
Kenya	2,28	n/a*
Netherlands	1,31	5,58
Average 2017	1,38	4,98
Colombia	1,39	4,04
Ecuador	1,25	4,68
Kenya	1,97	4,54
Netherlands	1,03	5,81
Average 2018	1,48	7,28
Colombia	1,56	6,20
Ecuador	0,98	4,15
Kenya	2,58	4,93
Netherlands	1,12	9,94
Average 2019	2,63	7,56
Colombia	2,77	5,58
Ecuador	1,96	5,37
Kenya	4,14	5,98
Netherlands	2,12	9,89
Average 2016-2019	1,67	6,19

**Export to Ukraine was not reported by Kenya*

The next stage of analysis is completed to study customs value at export from the exporting countries in question to trade partners all over the world (Table 5). Set of observations contain empirical data submitted by Columbia, Ecuador, Kenya or Netherlands on monthly basis.

Table 5. Customs value at export from the exporting countries in question to trade partners all over the world

Descriptive statistics				
	2016	2017	2018	2019
Mean	7,88	7,93	6,61	8,53
Median	6,28	6,19	5,72	6,1
Range	155,57	72,99	66,1	230,34
Confidence interval	7,72-8,05	7,77-8,09	6,53-6,70	8,34 - 8,72
count	4146	4507	5801	8460

The distribution of observations is normal distribution with significant right-hand asymmetry (shift towards larger numbers) characterized by the following points of descriptive statistics set up in Table 5 (for 95 % confidence). The confidence intervals for the mean give us a range of values around the mean where we expect the "true" (population) mean is located with a given level of certainty.

Customs values of each type of flowers classified in HS subheadings 0603 11 – 0603 19 are calculated using trade value and net weight volumes reported to UN COMTRADE by all the trade partners, on monthly basis (Table 6).

Table 6. Value and net weight volumes reported to UN COMTRADE

	2016	2017	2018	2019
Colombia				
060311	6,68	7,40	8,38	8,17
060312	6,06	6,28	6,39	6,27
060314	5,75	5,10	5,76	5,67
060319	5,07	4,88	4,89	4,88
Ecuador				
060311	6,13	6,12	5,77	6,01
060312	4,27	4,32	4,48	4,23
060314	4,23	3,89	4,58	10,05
060319	6,19	6,44	6,67	7,62
Kenya				
060311	n/a	n/a	4,60	4,93
060312	n/a	n/a	4,58	4,78
060314	n/a	n/a	2,63	2,46
060319	n/a	n/a	4,46	4,58
Netherlands				
060311	12,07	14,65	12,43	12,09
060312	9,23	9,52	10,39	10,50
060314	5,96	6,57	6,87	6,72
060319	14,25	15,36	16,95	18,47

The appropriate export price range was calculated using price filter method. The obtained data confirm that previously shown values completely meet the criteria of actual price range. The same tendency can be observed during the examined period (Table 7).

Table 7. Price filter method *

Exporting country	IQR of all values (CV per kg, in USD)			
	2019	2018	2017	2016
Colombia	4,36 - 6,41	4,36 - 6,38	4,35 - 5,86	4,35 - 6,04
Ecuador	4,6 - 6,82	4,02 - 5,99	4,34 - 6,09	4,36 - 6,21
Kenya	3,61 - 5,69	3,59 - 5,27	n/a	n/a
Netherlands	6,65 - 11,88	6,46 - 10,43	6,06 - 11,16	5,88 - 11,01

**for consignments of 500 kg or more*

Discussion

The role of the information component in the modern world is difficult to overestimate, because it is crucial for the formation of strategy. Any analytical work depends to the greatest extent on the quality of the data used. When analyzing global processes such as foreign trade, it is very important to check and control the objectivity of information obtained from open databases.

As a result of the study, it was found that the data of international trade statistics can be used for preliminary analysis of price information, as well as to identify significant discrepancies of exports and imports indices. The gradual application of the mirror analysis and price filter method make it possible to increase the reliability of results, obtain actual data, using benchmarking as an auxiliary tool for targeting customs value control measures.

It was found that in the researched period, the customs value of all types of flowers imported into Ukraine (on CIF basis, i.e. including transportation costs and insurance),was 72.5% less than the value declared at export (on FOB basis). When exporting from Colombia, the customs value of flowers at import to Ukraine was 50-75% less than the export value on FOB basis, when exporting from Ecuador - 63-76% less, from Kenya –30-50% less (excluding 2016 data) The largest difference was registered for the Netherlands - the customs value of flowers at import into Ukraine was 77-89% less than their value at export. At the same time the determined customs values were comparable and mainly within the interquartile range of the set comprising customs values at export from the above mentioned countries defined separately for each of the partner countries during the period 2016-2019. The set of observations can be described as a right skewed normal distribution, shifted right, that means towards higher values of customs value explained by objective pricing factors under normal trade conditions.

Conclusions

The obtained results confirm the point that mirror analysis or price filter method itself is insufficient to make undoubtable conclusions about the causes of such discrepancies. However, at the same time, the benefits of two-staged analysis within the framework of a risk - oriented approach are demonstrated. It should be established at the next stage, if certain transactions should be considered as fraud or tax evasion or, in opposite, they have resulted from favourable trade factors which had led to a significant reduction in price. A thorough verification, including in-depth analysis of documents should be done at the level of individual transactions. The purpose of the study was achieved; the shortcomings and capabilities of each of the methods are identified and their optimal combination is demonstrated as a helpful tool for price information analysis and control over the declaration of customs valuation.

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