

**DIGITAL TRANSFORMATION TAKE EFFECT
ON GREEN BUSINESS EFFECTIVENESS**

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In view of the ever-growing environmental issues and rapid digitalization of business, industrial ventures face an important mission of finding some balance between an advancement of existing business patterns based on digital technologies and a minimization of negative environmental consequences during their economic activity. Requirements of stakeholders for a high-quality transformation approach and introduction of information and communication technologies (ICT) for industrial ventures as well as the environmental friendliness approach used in their activities actualize the process of environmental friendliness mechanism based on the «green business» concept and a need to expand ICT in communication business management.

Works of G. Daley, O. Amosha, O. Baluyeva, M. Moiseyeva, M. Pashkevych, and O. Sadchenko are devoted to studies of economic and ecological systems of both a national and regional scope. The issues of enterprise management based on the ecological approach were developed in the scientific works of N. Andreeva, A. Bardas, O. Veklych, O. Popova, A. Sadekov, D. Smolennikov, S. Kharichkov, E. Khlobystov.

At the same time the issues of determining a degree of environmental friendliness of industrial enterprises and establishing the grain of their impact on an

external environment as well as the outcomes of economic activity of the entities still remain insufficiently developed in scientific literature.

Theoretical and methodological aspects of business process digitalization were enlightened in the works of such foreign scientists as: M. Blix, Ch.Gupta, H. Kroll, L. Hounshell, D. Horvat, A. Jäger, F. Bergeron, L. Raymond, A. Croteau, M. Brettel, N. Friederichsen, M. Keller, M. Rosenberg, K. Schwab, etc. The works of domestic scientists, in particular, V. Bozhkova, O. Volot, V. Kasyanenko, O. Kireva, K. Kovtunenکو, O. Kopyyka, L. Melnyk, A. Orekhova, G. Pocheptsova, I. Sotnyk, K. Tanashchuk, L. Taranyuk, etc. are preoccupied with the researched domain.

At the same time the problems of ICT implementation in industrial enterprise management, development of approaches to substantiation and optimization of decision-making on digitalization of communication business processes, enhancement of organizational and economic principles of communication business management still remain unsolved.

Modern industrial production is one of significant sources of the anthropogenic impact on an environment. The influence of industrial factors has a decisive effect on transformation of the biosphere due to the presence of complex and diverse links between a human habitat and its productive activity.

Firstly, a natural environment is a global spatial basis, in limits and according to the terms of which any human activity takes place, including industry. Secondly, the properties of the natural environment in a considerable degree affect forming of a complex system of unreasonable requirements and requests of humanity to ensure safety, quality, durability, comfort of human existence, and thus, define the hierarchy of real emerging human needs (objective and subjective, social and individual) which require the satisfaction. Thirdly, the natural environment is the main source of resource support for human life, that is, a great storage of natural resources, the use of which is highly necessary for the society for satisfaction of continuously growing needs of its members. However, the global (in relation to the existing limits of the human habitat) character of existence of natural environment until about a middle of the past century determined the nature of the attitude of people to the state of the biosphere based on

the human needs. Under such conditions, the interests of society in the relations with the natural environment were usually limited to a strictly «consumer» orientation.

Until recently environmental management has been considered to be the process of natural resource exploitation for a merely pragmatic purpose of meeting material and cultural needs of a society. The rational use of natural resources presupposed reliance on reason and knowledge as the use of nature has been always considered as a separate science which studies general principles of any human activity related to the use of natural resources or transformation of their state [1; 2].

Interaction and structural binding of a society, industrial relations and the environment under the technogenic system «production – consumption» [3, p. 66] which operation is based on amere exploitation of natural factors (artificial disruption of a natural environment) are due to the complexity and diversity of the process of natural factor use in the process of productive human activity.

It is noted in scientific works [4-8] that the paradigm of social and economic development based on technocratic-consumer attitude to nature is the main reason for imminent destruction of the biosphere, ozone depletion, climate instability increase, flora and fauna impoverishment. According to Z. Gerasimchuk [9, p. 62] it is the growth of anthropogenic pressure on the biosphere in the process of social development that causes a sharp aggravation of the environmental situation on a global scale which brings humanity closer to a critical limit in interaction with nature.

Yu. Stadnytsky [10, p. 75] also believes that anthropogenic pollution is currently one of the main global pressing problems of human development around the world in general and Ukraine in particular. The negative effects of anthropogenic pollution which until the middle of the last century were often considered insignificant «external effects» and could be neglected while choosing the optimal technologies or trying to justify the economic development increase one of the greatest threats to human welfare and security. The author also insists that a reduction of anthropogenic pollution by a society is of almost no technological or technical difficulties. In his opinion the answer to this problem is a merely economic task the complexity of which is mainly due to the excessive cost of implementation measures to improve the environmental safety of

production. Therefore, under current conditions the maximum attention should be paid to the optimal use of limited resources that can be used for environmental purposes.

V. Scherbak [11, p. 51] in its turn supposes that the technological progress of mankind still consists of a series of use-depletion cycles of resources each of which involves sequential passing of certain stages:

- developing (creation) and expansion of the previously unused («non-existing») natural resource base;
- exhausting of the used natural resource base and the result making worse in terms of existence of society in an environment, the search for reserves to renew or replace the resource base;
- replacement of the outdated resource and environmental base by new sources of natural resources (and also occurrence of new, generally, more acute and complex environmental and resource problems).

Today environmental activity intensification for the sake of social and economic development is of great importance not only at the macro level but also at regional and business levels. Thus, according to L. Maslovskaya [12, p. 64] with a general orientation of the state strategy of transition to the principles of sustainable development the territorial regulation of ecological management acquires a special relevance. Regions become a kind of economic, social and ecological core of geo-economic space as well as the sphere of mobilization of material, labor, financial and intellectual resources for this purpose [13-19]. It is at the regional level that it becomes quite expedient and possible to achieve the balance of structure and production scale with the structure and magnitude of the integrated natural resource potential as well as environmental priority establishment for its use.

Scientific approach analysis for economic and environmental study of activities and patterns of development as well as ecological and economic development of industrial enterprises [20-21] allow to identify such components (varieties) for their realization as social-psychological, organizational-structural, technical, technological, financial, commercial, communicative, informational, functional.

According to some authors industrial enterprise development on the basis of the

concept of green business is its main environmental priority. At the turn of the new millennium there was a need for a new vision of a global environmental situation by the world community and an era of a «new responsibility» of all states for the earthly civilization safety. Former notions of «living for themselves», for the good of only their territories and peoples by limiting the interests of others have completely «played out».

Awareness of the environmental danger that threatens humanity has united the efforts of scientists, politicians and businessmen today to find a way out of this situation. Ecological balance preserving has become the main tendency in decision-making for the problems of environmental protection and business development. In 1987 the World Commission on Environment and Development established at the initiative of the UN General Assembly declared the problem of sustainable economic development and economic balance in their report «Our Common Future» as a general form of development and progress of the society. Meeting the needs of today's inhabitants of the Earth should not limit the ability of future generations for their existence. This means a transformation of human and financial resources as well as resources of animate and inanimate nature to meet reasonable needs of a man with a continuous improvement of his living conditions. Sustainable development requires new forms of financial cooperation and new ways of project financing. At the same time the «green industry» or «green sectors» of the economy are designed to materialize new sources of growth associated with an efficient use of natural resources and environmentally efficient technologies in ecological products and services and thus in added value and profits of companies engaged in these activities. Promoting their development and «greening» the traditional «brown» technologies and business models are central prerequisites of government strategies for the transition to a «greener» economy.

The global acceptance of technologies and methods that are less environmentally harmful has been recognized as vital for a further development of mankind and adoption and implementation of environmental standards, elimination of environmentally harmful subsidies for the resource use, energy and raw material price growth have stimulated a technological renewal aimed at its negative impact reduction

which became known as «green business» and companies began to be called «green businesses» or «environmentally conscious businesses». At the same time these processes have led to a dynamic and rapid growth in a number of companies offering goods and services that increase resource efficiency, improve waste management and minimize environmental damage. These ventures appeared in all sectors of the economy and later became known as the «environmental goods and service sector» or «green» business (WB).

The ideology of «green» business fits well with a need to improve an environment at the same time ensuring economic development. «Green» or environmental business is a diversified area of business that can provide not only environmental but also significant economic effect on a national scale. Being an economic agent a source of employment and a key factor in economic and social well-being this sector cannot remain unchanged. In order to solve the problems of today and to ensure economic development while maintaining a high level of environmental quality we stake on greening the industry.

Today green business offers decisions for some of society's most pressing environmental problems:

- the design and construction of energy efficient buildings;
- the recycling and safe waste management;
- the development of renewable energy;
- and the wastewater treatment [22].

The Ukraine's economic system remains environmentally unfavorable. Ukraine ranks one of the first places in the world in terms of consumption of natural resources – energy, water, minerals – per unit of GDP. Ukraine's water resources consist of surface and groundwater. Surface fresh water bodies of Ukraine cover 24,1 thousand km², or 4,0 % of the total territory (603,7 thousand km²) of the state. These include rivers, lakes, reservoirs, ponds, canals and more. There are 3,3 thousand rivers longer than 10 km; their total length is 94,4 thousand km. The average density of the river network is 0,34 km / km². Ukraine is one of the least water-supplied countries in Europe

as the reserves of local resources of a river runoff per person are about 1,0 thousand m³ per year.

According to the State Agency of Water Resources of Ukraine the supply of Poltava region with an average long-term river runoff (per 1 km²) is 1788,2 thousand m³ per year. Also, the discharge of return water into the surface water bodies of the region in 2017 amounted to 70 million m³. Thus, the main factor of anthropogenic pressure on surface water resources is still significant volumes of water consumption for economic activities and discharges of polluted waters [23]. Taking into account such an environmental situation it is advisable to conduct a research on enterprises engaged in the production and installation of nature treatment facilities.

We made the research for the Production Cooperative «Environmental Enterprise» «Ecology» (Kovpaka Street, 21; Poltava, www.ecology.com.ua).

The environmental enterprise «Ecology» was established in 1990 to implement the latest domestic biotechnologies for domestic and industrial wastewater treatment. More than 400 facilities have been commissioned during the company's existence. The biological treatment technology developed by company's specialists was awarded with the State Prize of Ukraine in the field of science and technology. This patented technology formed the basis for creation of the «Dzherelo Wastewater Treatment Plant» that received a positive response from the Institute of Environmental Problems of the Ministry of Ecology and Natural Resources, the expert opinion from the State Labor Inspectorate and the hygienic opinion from the Ministry of Health of Ukraine.

The subject of activity of the PC EE «Ecology» is:

- the production of mobile block installations of biological water treatment of industrial and domestic sewage, their installation, adjustment, operation;
- the construction and installation works on maintenance and reconstruction of treatment facilities for biological treatment of domestic and industrial wastewater with the introduction of new biotechnologies;
- the engineering and technological development and implementation of new methods of biological treatment: industrial and domestic wastewater, reservoirs, rivers and bays; industrial gas emissions, soil and oil sludge and fuel oil pollution of

equipment and communications with slag;

- the design works performance of biological treatment facilities;
- the realization of projects and blueprints on biological sewage treatment for enterprises, organizations and the population;
- the consultancy on biological wastewater treatment and design solutions;
- the educational and methodical training of specialists in biological wastewater treatment.

PC EE «Ecology» is an official representative of Ekofinn-Pol (Poland) and WavinLabko (Finland) in Ukraine.

One of priority problems of PC EE «Ecology» which answer requires a special attention of state environmental authorities, scientists and entrepreneurs is the adoption and implementation of water protection measures aimed at improving the ecological condition of rivers.

The company occupies 25% of the domestic market of treatment facilities in terms of production. 39 % according to the results of our research is occupied by the Corporation «Energoresurs-Invest» (Lviv), 15 % – by LLC «Uniprof WW» (Lviv) (Fig. 1).

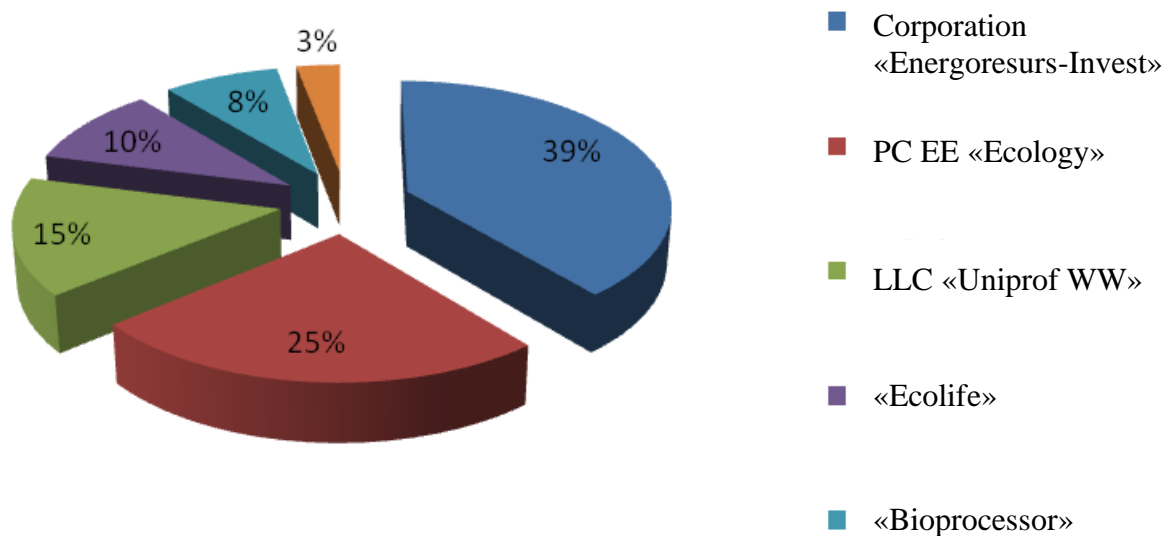


Fig. 1. The structure of the water treatment facilities market in Ukraine

Source: Developed by the authors and based on the market research

It should be noted that water treatment and wastewater treatment technologies are the technologies of interest to scientific and business environment and the growth rate of both scientific publications and patent publications in many areas exceeds 400% and sometimes – 3000%.

At the same time Ukrainian priorities lack advanced world tendencies: digitalization of management, control and provision of services in the field of water supply and sewerage; computerization of water supply and drainage, etc. Therefore, it is desirable to add these areas to the list of Ukrainian sectoral priorities especially regarding water supply and sewerage digitalization and water purification from organic pollutants [24].

Digital transformation is an introduction of modern technologies into business processes of a venture. This approach implies not only installation of modern equipment or software but also the fundamental changes in approaches to management, corporate culture, external communications. As a result, a productivity of each employee and a level of customer satisfaction increase and a company gains the reputation of a progressive and modern organization.

The issue of digital transformation is quite difficult and wide by content, because the problems of technological development in one area motivate to the occurrence of problems in other areas. The first step to introduction and dissemination of digital technologies is needed realization of changes – of imperative caused of the imminent digital breakthrough, which allows the enterprise to improve its position in the market and significantly increase the value of innovative propositions [25].

Digitization of processes is relevant not only at the level of individual enterprises: entire industries choose their own path of development as the only way to meet rapidly changing conditions of the world. Due to this digital transformation of an industry is already changing the activities of every enterprise.

Customers are one of the main drivers of digitalization – many of them have already begun to transform their activities. By customer experience we mean not only interaction with foreign customers but also domestic customers. Digital transformation of processes optimizes the work of employees of a venture which increases the

productivity of each individual team member. Digitization technologies allow you to organize personalized interaction in the most favorable way preferred by a customer. Digital communication channels, omnichannel, artificial intelligence, robotics provide more time to solve really important and complex tasks.

Digitalization of business encourages innovative ways of a venture development, in particular:

1. Cloud technologies allow several teams to work on one project simultaneously and efficiently using the company's resources.

2. Using the Mobile First strategy companies receive and monetize mobile traffic which by its indicators has already caught up with the traffic of stationary devices.

Ready-made answers save time on tasks. Various programs, extensions and connectors optimize operation of a venture and require a minimal time for their implementation and adaptation.

In this regard the digitalization of water supply and sewerage namely the digitalization of installations and processes helps concerned companies to get the most of this process.

Thus, Siemens has developed Digital Enterprise – a comprehensive portfolio of software and automated solutions. All available data processing within the framework of a complex data model allows to use all system optimum potential.

Intellectual integration of data using a variety of sources such as sensors, water meters and meteorological data creates new opportunities for water use in industry. A prerequisite is end-to-end network organization of system engineering – from commissioning to operation, maintenance and optimization of a current process on the basis of a data platform – the integration of virtual and real worlds. An improved data quality and availability reduce project implementation time in the real world.

Thus, the requirements for domestic industrial ventures in the context of digitalization and globalization of world markets necessitate new effective decision-making for business digitalization (including «green business») to increase their competitiveness.

It should be noted that possible social-economic and ecological-economic

consequences of different priorities to production and consumption approaches of ecological products as well as a need for ecological regulation of production are illustrated by the matrix «benefits – losses» (Fig. 2).

If costs for environmental parameter up grading of a product quality increase in proportion to the level of environmental friendliness and, accordingly, the price increases the contradiction between the environmental and economic interests of a customer (consumer) and a manufacturer does not arise. In such a case a price does not encourage a manufacturer to improve quality. The demand for organic products is restrained.

In this case it is possible to set such a new price ($P + \Delta P$) when a relative price increase is less than a relative increase in the level of environmental friendliness (quality) $(\frac{\Delta E}{E})$ and is above a relative increase in cost $(\frac{\Delta C}{C})$.

The given approach can be represented as follows:

$$\frac{\Delta R}{R} \geq \frac{\Delta E}{E} > \frac{\Delta P}{P} > \frac{\Delta C}{C}, \quad (1)$$

where R is reduction of external environmental costs of production and consumption;

$\frac{\Delta \dot{I}}{\dot{I}}$ – a relative reduction of external environmental costs.

The given ratio between quality (environmental friendliness) of production, its price and expenses is the best from the point of view of social and ecological interests of both a society as a whole.

The price in this case stimulates an increase of ecological quality of production and an increase in demand for it. In accordance with the growth of environmental friendliness of new products, external environmental costs (environmental and economic damage) are reduced both for an consumer and a society as a whole.

Let's consider some conditions for economic and environmental interest coordination of a producer and a client (consumer). If a price for products of the high environmental quality for an individual consumer was specified in proportion to an increase in quality, i.e. if:

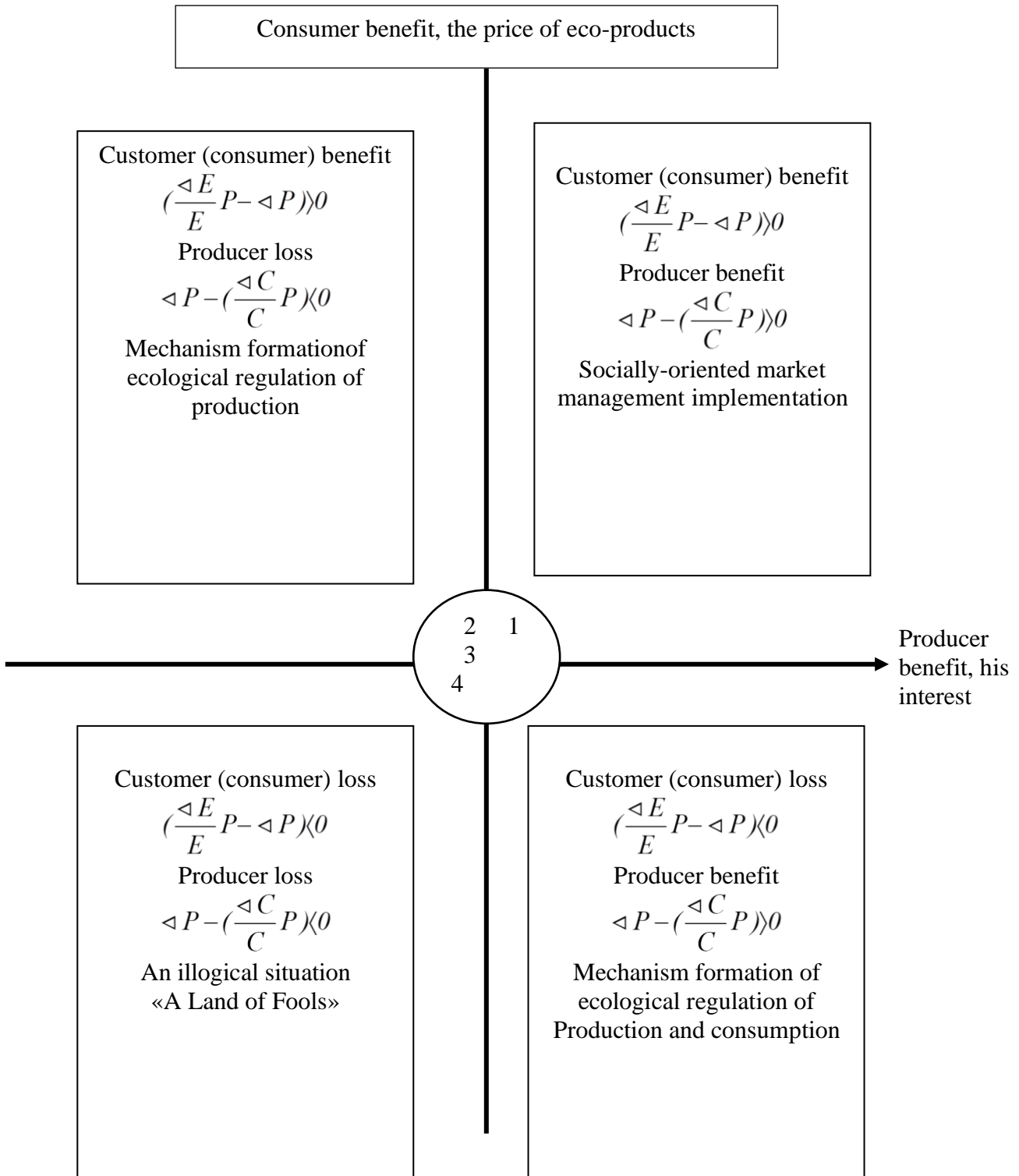


Fig. 2. The matrix of ecological production «benefit-loss» of a producer and a client (consumer)

Source: Developed by the authors on the basis of the «buyer-seller» matrix by Igor Ansoff [26, p. 84].

$$\frac{\Delta P}{P} = \frac{\Delta E}{E}, \text{ TO } \Delta P_e = \frac{\Delta E}{E} \cdot P,$$

where ΔP_e is a price increase of an increase in ecological quality per value of ΔE .

If a price for these products would be specified in proportion to the cost, i.e. if:

$$\frac{\Delta P_c}{\Delta P} = \frac{\Delta C}{C}, \text{ TO } \Delta P_c = \frac{\Delta C}{C} \cdot P,$$

where ΔP_c is a price increase of an increase in costs per value of ΔC .

The condition of interest coordination of an individual consumer and a producer looks like that:

$$\Delta P_e > \Delta P > \Delta P_c. \quad (2)$$

It is important to note that a manufacturer will benefit from:

$$\Delta P - \Delta P_c = \Delta P - \frac{\Delta C}{C} \cdot P, \quad (3)$$

and a consumer benefit will be as follows:

$$\Delta P_e - \Delta P = \frac{\Delta E}{E} \cdot P - \Delta P. \quad (4)$$

The total benefit of both a producer and a client (consumer) is determined by value of:

$$\Delta P_e - \Delta P_c = \left(\frac{\Delta E}{E} - \frac{\Delta C}{C} \right) \cdot P. \quad (5)$$

The amount of this total benefit can be divided into three parts: the benefit of an individual consumer, the benefit of a producer (a venture) and the benefit of a society (in particular, a state) as a whole.

Let us now consider in more detail a substantive basis of the quadrants of the matrix. Quadrant 1 «Customer (consumer) benefit, producer benefit» meets the principles of socially-oriented market economy and sustainable social-economic development and also reflects the system of long-term mutually beneficial relations «buyer – producer» as it is provided as a return on investment and satisfaction of social and ecological needs of a buyer within reasonable prices.

Quadrant 2 «Customer (buyer) benefit, producer loss» corresponds to the situation when external environmental costs of production, the lack of a positive effect assessment of production and consumption of organic products become the subject of environmental regulation of production from the standpoint of ecology friendliness stimulation of a single venture.

Quadrant 3 «Customer (consumer) loss, producer loss» corresponds to the situation which in the terminology of I. Ansoff is called «A Land of Fools» [26].

Quadrant 4 «Customer (consumer) loss, producer benefit» reflects the case when a producer receives some profit from sales but does not provide a consumer with a product which level of environmental quality would correspond to the price. This situation often occurs in industries with a low level of technological development.

However, such a situation may occur in the production of new goods in highly developed industries based on innovative technologies when interests of a buyer are not always taken into account.

Thus, the conceptual approach to ecological and economic development of an industrial enterprise taking into account the green business concept has been formulated on the basis of available theoretical support analysis. In accordance with the modern realities aimed at natural and economic resource use it has been determined that increasing the ecology friendly economic activity we ensure both effectiveness of environmental and economic activities of an enterprise and the program implementation of environmental and economic development of a region.

Digital transformation approach enables an accelerated adaptation of communication business processes of industrial enterprises to the challenges of an external environment making easier the work of a user, the quick response to customer (consumer) requests and an increase in productivity of all business processes of industrial enterprises.

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