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# SOCIAL FACTORS OF ECONOMIC GROWTH, ANALYSIS OF THE EFFECTIVENESS OF TOURISM AND MANAGEMENT

Collective monograph

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REVIEWER

Kvasnytska Raisa – Doctor of Economics, Professor of Finance, Banking and Insurance, Khmelnytskyi National University

Dovgal Olena – Dr.Sc. of Economics, Professor (Full), Professor of the Department of International Economic Relations of V.N.Karazin Kharkiv National University.

Breus Svitlana – Doctor of Economic Sciences, Professor, Professor of the Department of Management and Innovative Providing, European University.

Slavkova Olena – Doctor of Economics, Professor, Head of the Department of Public Administration and Administration of Sumy National Agrarian University

Yavorska Oksana – Doctor of Economic Sciences, Associate Professor, Professor of the Department of Tourism, Hotel and Restaurant Business, Faculty of cultural and creative industries Kyiv National University of Technologies and Design.

Marina Klimchuk - Doctor of Economics, Department of Organization and Management of Construction Industry, Kyiv National University of Building and Architecture.

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**SECTION 4. ENTERPRISE ECONOMICS AND PRODUCTION MANAGEMENT**

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## 4.1 Transformation of socio-economic systems and adaptation of enterprises for additive (digital) production

The study of modern enterprises' adaptation processes to additive (digital) production in the conditions of transformational changes of a bifurcation-breakthrough nature requires special scientific attention today. Adaptation and transformation are considered different processes but can overlap, so transformation includes adaptation to new conditions. But it can be the other way around when the gradual adaptation of socio-economic systems leads to transformation. Adapting modern enterprises to transformational changes requires adjustment (adaptation) of human capital to new business conditions. To a greater extent, the work is devoted to these aspects.

Many scientific works have been devoted to transformation issues, among which should be noted: Reis J., Amorim M., Melão N., Matos P. (Reis et al., 2018), Hanelt A., Bohnsack R., Marz D., Antunes Marante C. (Hanelt et al., 2021), Cozzolino A., Verona G., Rothaermel F. T. (Cozzolino et al., 2018), Stentoft J., Adsbøll Wickstrøm K., Philipsen K., Haug A. (Stentoft et al., 2021). We have previously substantiated the concept of additive economy and the main transformational processes in the direction of Industries 3.0, 4.0, and 5.0 (Melnyk et al., 2022). But the relationship between the processes of transformation and adaptation needs additional research.

Industrial revolutions accompany transformational transitions of socio-economic systems. The basis of the adaptation mechanisms of socio-economic systems is the mechanisms of positive and negative feedback. Often changing the parameters of the system and the combination of the specified feedback mechanisms ensure the system's stability.

*The negative feedback mechanisms* ensure the maintenance of the existing homeostasis of the socio-economic system.

*Positive feedback mechanisms* ensure change and transformation of the state of the socio-economic system.

***Adaptation mechanisms*** assume such a nature of changes in the system that allows it to adapt to the influences of the external environment without losing its fundamental distinguishing features. With the adaptation mechanism, despite all changes, the system continues to preserve its integrity, that is, to remain itself: a biological organism is the same biological organism, a family is a family, a firm is a firm, a military unit is a military unit, a state is a state (Melnyk, 2016).

***Bifurcation mechanisms*** assume such a nature of changes in the system which the system loses its fundamental distinguishing features, passing into a new quality while preserving the hereditary connection with the former state.

These transformational mechanisms are dialectically interconnected. The adaptation mechanism implements the function of adapting the system to changes in the environment through the selection of states of the system itself. Microevolution of the system takes place at the system level, according to the principle of I. Prigozhin: minimum entropy production at maximum system entropy. After the adaptation capabilities of the system are exhausted, the "degeneration" ("moral aging") of the system occurs, and the macroevolution of this type of system (biological population, market) begins. Adaptation to environmental conditions at the macro level, i.e., by selecting systems at the supra-system level. In this case, the bifurcation mechanism is included, ensuring the maximum speed of replication of the "new" (new types of biology, new economy technologies). In the conditions, A. M. Hazen's principle is implemented: maximum entropy production at a minimum system entropy. This begins selection at the supra-systemic (metasystemic) level (Melnyk, 2016).

The transition to new business principles for domestic enterprises, in which information and information communication technologies are the main sources of economic, social and cultural development, implies a change in the organization of the work of enterprises.

Enterprises are open system that is in constant interaction with the external environment. Interaction is mediated by input and output flows of energy, information, material resources and products of their use. The presence of such flows allows us to

consider enterprises as dynamic systems striving for a steady state in which incoming and outgoing flows are balanced.

It is worth noting that the adaptation of enterprises to the conditions of the external environment is a natural consequence of transformational changes in the economy. Even before the 90s of the XX century a situation prevailed when the pace of change in the external environment of enterprises did not significantly differ from the speed of adaptation of their internal processes and elements. During the time of command-planned management of the economy, it was possible to determine the probability of a certain situation occurs, which made it possible to adapt to changes without complications, using experience and proven models. In those days, enterprises' adaptation process did not have theoretical and practical problems. The situation became more complicated when enterprises entered the independent decision-making stage, and changes in the country's economy gained momentum. Changes in the external environment have acquired a transformative and breakthrough character. In the first case, the need for adaptation grows gradually, which increases the probability of choosing adequate directions for enterprise changes. In the second case, there are sharp changes in the external environment, which take the form of a crisis-like drop in the efficiency of the enterprise. There is a need for an operational response to events, which reduces the adaptation potential of the enterprise and increases the probability of making suboptimal decisions.

Adaptation of enterprises to changes in the external environment is carried out using: standard management and technological operations, standard investment and search operations. The first two types of operations involve the use of experience to adapt to unforeseen circumstances that have arisen again and to maintain the stability of the economic situation within acceptable limits. The search form of adaptation is an innovative activity used when the first two types do not give the required result. This form of adaptation increases the enterprise's flexibility, expanding the possibilities of adapting current activities to unforeseen circumstances.

Regardless of the specific form, innovative behaviour aimed at ensuring better adaptation of the enterprise to uncertainty is manifested in its restructuring or reformation.

Changes that are planned to be implemented and have an economic, organizational, production, social and other nature, first of all, require adjustment (adaptation) of human capital to new business conditions. The changes transform the conditions of collective activity, which requires implementing certain adaptation measures and tools for managing the adaptation of enterprise collectives.

The adaptation of the collective of enterprises, in contrast to the adaptation of enterprises and the adaptation of personnel, is a process of multi-level directed qualitative transformations in the composition, structure and relations in the collective and between the collectives of the enterprises of the association, which are conditioned by new conditions of activity.

Adapting the company's staff to the information society involves introducing new technologies and tools that allow more efficient collection, processing and use of information. It is also necessary to provide training and retraining of personnel to work effectively with new tools and technologies.

Steps that an enterprise can take to adapt to transformational changes in the economy:

1. Implementation of new technologies: the enterprise must install and maintain the necessary equipment and software to ensure efficient work with information.

2. It is necessary to monitor new trends and technologies, invest in developing new products and services, and maintain an innovative spirit among the team.

3. Training and retraining of personnel: enterprise employees must have the necessary knowledge and skills to work with new technologies and tools. The enterprise can conduct education, training and workshops for personnel.

4. Employees need to be provided with access to training using the latest technologies and software and support in solving technical problems that arise at work.

5. The use of cloud technologies: the use of cloud technologies allows access to data and programs from anywhere in the world, which significantly increases flexibility and productivity.

6. Development of information culture: The enterprise must create a culture where working with information is important. This can be achieved by creating a system of internal communication, cooperation and knowledge sharing between employees.

7. Ensuring the security of information and data: the enterprise must ensure proper protection of data and information collected and stored at the enterprise; protection of confidential and important information from unauthorized access, using various technical and organizational methods and methods.

8. Use of social networks: Social networks can be used to improve the effectiveness of communication and collaboration between employees, as well as to attract new customers and develop business.

The team's adaptation types can be classified according to the form, the content of the main measures, the degree of coverage and the specifics of implementation. Thus, the basis of distribution by form is the goals and effectiveness of adaptation, which is connected with the stabilization or the development of the company's team. The content of the main measures of adaptation is related to measures of a social, motivational, organizational, informational and economic nature. Adaptation measures can be implemented at the level of individual collectives of the enterprise and at the level of collectives of enterprises of the association, i.e. comprehensively.

The main means of successfully adapting the team to the additive (digital) economy is an effective mechanism that ensures the wide use of information and communication technologies in the final results.

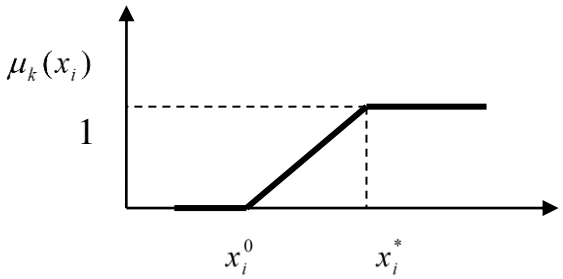
The formation and implementation of the organizational and economic mechanism of staff adaptation is proposed to be carried out based on such principles as obligation, constancy and continuity, complexity, systematicity, flexibility and effectiveness.

Let's consider the approach to the assessment of adaptation potential. The expediency of applying the theory of fuzzy sets in the assessment is that when investigating the functioning of collectives and enterprises in transformational changes, a sufficiently large number of new sources of uncertainty can be determined. At the same time, there is a shortage of qualitative and quantitative initial data. That is, there is an uncertainty that cannot be revealed unambiguously and clearly. Certain parameters cannot be measured, leading to the appearance of a subjective component, expressed by vague estimates, that is, a linguistic component with its term-set of values. The relationship between the quantitative value of a certain factor and its qualitative linguistic description is given by the functions of the factor belonging to a fuzzy set. So, the generalized assessment of adaptation potential using the membership function has the form:

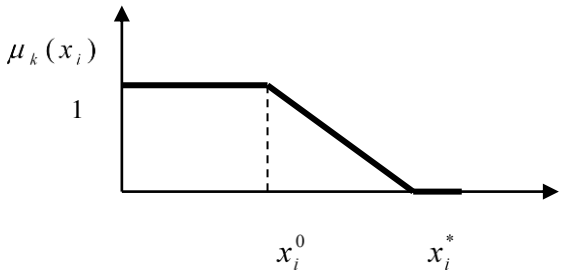
$$\bar{\mu}_{\kappa} = \left(\sum_{i=1}^{n} \lambda_i \, \mu_{i,k}\right) / n \,, \qquad (1)$$

where $k$ is the number of the object; $i$ – the number of the sign; $\lambda_i$ is the weight of the $i$-th characteristic; $\mu_{i,k}$ is the value of the membership function of the "good adaptation" state for the $i$-th feature of the $k$-th object; $n$ is the number of features.

The membership function should be determined using the interval method of estimating the parameters of the distribution of random variables, which consists in determining the interval (rather than a single value) in which the value of the estimated parameter will fit with a given degree of confidence. The interval estimate is characterized by two numbers - the ends of the interval, within which the true value of the parameter is likely to be. Interval estimates are more complete and reliable compared to point estimates, they are used for both large and small samples (fig. 1).




$$\mu_k(x_i) = \begin{cases} 0 & if \quad x_i^a \le x_i^0; \\ \dfrac{x_i^a - x_i^0}{x_i^* - x_i^0} & if \quad x_i^0 < x_i^a < x_i^*; \\ 1 & if \quad x_i^a \ge x_i^*. \end{cases}$$




$$\mu_k(x_i) = \begin{cases} 1 & \text{if} \quad x_i^a \le x_i^0; \\ \dfrac{x_i^0 - x_i^a}{x_i^0 - x_i^*} & \text{if} \quad x_i^0 < x_i^a < x_i^*; \\ 0 & \text{if} \quad x_i^a \ge x_i^*. \end{cases}$$

Figure 1. Intervals of the parameters of the distribution of random variables when estimating the membership function

The current state of adaptation of the team is assessed by the method of fuzzy classification, which is based on comparing the object with the given classes. That is, not the alternative (best, worst) is chosen, but the class to which the object belongs to the greatest extent. Experts form class member functions. If the classes are ordered by quality, it is possible to order the set of classified objects based on generalized class membership functions. Along with class membership functions, logical methods are used for classification. They are used to implement expert systems. Therefore, the assessment of the current state of adaptation of the team must go through several stages - this is the construction of a classification model and the actual classification of objects based on it.

Therefore, the assessment of the current state of team adaptation is carried out in the following sequence:

- create a list of features that characterize the object ($y = (y_1, y_2, \ldots, y_n)$);
- determine the interval of values of each feature;

- establish the level of significance of each feature in the overall assessment of the object ($w_i$);
- determine the list of values of the linguistic variable $K = (K_1, K_2, \ldots, K_m)$;
- set membership functions for each class;
- present a set of current attribute values $y(x) = (y_1(x), y_2(x), \ldots, y_n(x)$;
- substitution of feature values in the function of belonging to each class;
- form a vector of an object belonging to each of the classes;
- calculate the degree of belonging of the classified object to the sth class: $P(K_S) = \sum_{j=1}^{n} w_j \mu_{S,j}(x)$;
- determine the class to which the object belongs to the greatest extent: $K^* = \arg(\max\{P(K_1), \ldots, P(K_S), \ldots, P(K_m)\})$.

Ukrainian enterprises are at the initial stage of their reformation. Therefore, we will additionally focus attention on such adaptation measures that are expedient precisely at this stage of industry transformations - this is, for example, the definition of a training program for managerial personnel, which combines training and self-study; formation and implementation of mechanisms for involving team members in the innovation process; formation of prerequisites for the implementation of the general quality management system.

At the initial stage of carrying out measures to reform the industry, the connection between the success of their implementation and the psychological training of effective managers with a high level of managerial competence, who have managerial talent determined by intellectual professional talent, unique professional knowledge, skills and abilities, highly professional motivation and corporate professional values that ensure effective decision-making to achieve significant results in managing the effectiveness of enterprise teams. The Pareto principle recognizes that 20% of the effort gives 80% of the result, which in relation to the enterprise's collective means participation in the created income of one-fifth of the collective. This part is a talented staff that ensures the intellectual and innovative development of the enterprise. Such personnel's management (planning, formation, organization and control) requires

management talent. Its formation and development is a set of managerial actions, which include, firstly, the attraction, assessment, and development (training and self-training) of talented managers who can effectively solve complex production tasks, organize new and improve existing business processes, prospects which are related to work in senior management positions; secondly, actions to take into account the best individual qualities of each manager and provide assistance in eliminating the deficit of professional and business qualities, which are mandatory in the new conditions of the enterprises of the industry.

Another direction of adaptation of the collective of enterprises to the new conditions of activity during the reform of the industry is the formation and implementation of mechanisms for involving collective members in the innovation process. An important problem that needs to be solved in this aspect is overcoming the resistance of personnel to innovative changes.

**Acknowledgement**

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