Rates and factors of organizational changes

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Abstract: Research summary: Organizational changes are caused by the stochastic conditions of external environment that lead to higher economic risks and uncertainty. Organizational changes are aimed at increasing the efficiency of management, choosing the business strategy and providing sustainable development. The research objective is to estimate the appropriate frequency of organizational changes, and the factors that affect this characteristic. Frequent changes can lead the system to the state of chaos, and the increased resources expenditure will be required to overcome it. The authors define a criterion for assessing the optimal interval between subsequent changes in the socio-economic system. Also, they interpret the notion of a company's resource barriers and propose their classification. Managerial summary: The authors defined a criterion for assessing the optimal interval between subsequent changes in the socio-economic system: a sum of losses caused by changes and losses of the market share due to the lack of timely changes and the reduction of company's competitiveness. Organizational changes depend on the dynamics of external environment that defines their volume. The stronger competition in the sector, the larger organizational changes, which require a great number of various resources. The interpretation of the notion of company's resource barriers is proposed. Three types of resource barriers are identified. An interval between changes should be enlarged to enable managers to search for necessary resources and to provide trust in the interaction with internal and external social organizational environment. **Keywords:** characteristics and factors of changes, employees' attitude to organizational changes, optimal interval between changes in the socio-economic system, scale of change, resource barriers.

1. INTRODUCTION

Transition periods in the development of society and its institutes are interesting for study, because they are associated with the change of social and economic situation and relations. A new socio-economic situation defines the nature and content of economic relations. The source of their development is the contradictions between new needs and their implementation. The awareness of the needs and contradictions turns them into interests, and stimulates the behavior of economic relations agents. The important factors, which create unstable and unpredictable external environment and stimulate organizational changes, encompass globalization, competition between enterprises, new information and other technologies, and growing needs for socially responsible corporate behavior. In-house factors are important too, which are associated with the creation of the mechanism of control over changes that would take into account their characteristics, terms, volume, necessary resources, and employees' attitude. Targeted organizational changes are associated with the definition of business strategy and sustainable development. The mechanisms for launching the sources and activating the driving forces are represented by various mindsets that actualize the needs and contradictions of organizational behavior and development of economic agents. The interests of agents of changes are expressed in two forms: new norms (need for flexibility and adaptation of the company's management and employees in a stochastic, turbulent situation, which leads to higher economic risks and uncertainty, etc.) and new ideas (ideological support of processes). Only a changing, flexible and dynamic organization can function successfully in complex economic and social environment.

2. METHODS

There are various approaches to the interdisciplinary notion “organizational change” in science. Economic, sociological and managerial aspects of organizational changes are revealed in the works of some modern researchers: Adizes, 1999; Al-Haddad and Kotnour, 2015; Andreeva, 2004; Armenakis and Bedeian, 1999; Armenakis, Harris and Mossholder, 1993; Bechard and Harris, 1987; Burnes, 2004; Conner, 1992; Cummings and Worley, 2009; Dunphy and Stace, 1993; French, 1984; George and Jones, 2007; Heller, 1998; Isern and Pung, 2007; Ivanova and Zivkovich, 2016; Jansson, 2013; Jones, 2004; Kazakova, 2006; Kotter, 1996; Miller, 1982; Prigozhin, 2003; Shirokova, Merkuryeva and Serova, 2006; Tichy and Shermann, 1993; Varfalovskaya, 2012; Watzlawick, Weakland and Firsh, 1974; Yang, Zhuo and Yu, 2009.

Some researchers focus on the analysis of the conceptual part of changes (Gitelman, 1999; Huber, Glick, Miller and Sutcliffe, 1993; Van de Ven and Poole, 1995, and others). They define the content of changes as differences in the form, quality or state of an element of organization over time. The researchers’ study both the initial state of the organization and its current or future state after transformations.

Other authors make a strong case for their view of a change and treat it as both conceptual and procedural. They present it as a transformation of an organization between two moments of time, i.e. the reasons that caused changes and sub-processes of making a decision about the change, its elaboration and implementation in the organization (Barnett and Carroll, 1995; Kanter, 1999; etc.). Thus, R. Daft defines organizational changes as mastering new ideas or models of behavior by a company (Daft, 2001). Application of the process approach gives an opportunity to define the means of making organizational changes.

As shown by the analysis of scientific works devoted to organizational changes, the researchers studying the efficiency of organizational change management point to the need to develop the plan of changes. Besides, they study the instruments and velocity of change. However, the frequency of changes and the due time intervals between them fall out the research field. The factors that affect these characteristics are understudied. If these parameters in management are ignored, an enterprise, or even the economy of a country in general, may fall into chaos. We need to take into account the optimal frequency of changes or certain intervals. For instance, in software development, the languages of programming and operational versions change quite often. Is it justified? In this case, we need to implement new OS or to study the languages of programming. They are compatible; nevertheless, we have to lose working time and finances for the implementation and debagging of programs. Besides, we have to buy licensed programs. There are positive and negative effects of these innovations. Therefore, we possibly need not hurry with changes. Probably, we should make a managerial decision based on planning and forecasting, implement it and thus create the possibility for the enterprises to be engaged in productive labor and then stop.

The authors of the paper face interesting research tasks. When should we start changes? When do we reach the critical mass? How many changes can we make in the organization in short time (how many projects can be executed in one organization simultaneously)? What is their optimal frequency: once in five years or once in ten years? Do the specific features of an enterprise influence these characteristics? When should we stop? Probably, when it increases costs or enlarges the losses of consumers (enterprises).

3. RESULTS AND DISCUSSION

To represent a business organization (enterprise) as an object-system means to reveal its primary elements and ties between them, and to apply the law of composition or conditions, according to which the ties are implemented and the elements create the integrity. Many

primary elements of development involve what we can call "carriers" of development or system factors of development. The carriers of development are the objects and results of development at the same time. They may have both diachronic and synchronic relations. The explication of the carriers of development is one of the most difficult methodological problems. This is the answer to the fundamental question of the problem under analysis: what develops and what does it develop into. This question, it turns, consists of two sub-questions. What develops – a system or some chaotic state? What does it develop into – a system into a system, a system into chaos, chaos into a system, chaos into chaos? Often, visibility does not coincide with reality; therefore, it is important to raise the issue properly from the very beginning. Dialectical consideration of the "system – chaos" pair leads to the following results. First, system and chaos are opposites. They inevitably supplement each other. Second, they exist in each other "as a germ". Third, mutual transformations and equity of these opposites are possible under certain conditions. However, these obvious statements need quite non-obvious and meaningful interpretations. As soon as a researcher begins to register a certain system in reality, it turns out that two operations are inevitably performed instead of one: the first is identifying a system explicitly and the second is identifying a non-system. In this case, the latter is a chaotic random set of various objects (especially, if we do not limit ourselves to this reality). This is disorder (chaos). Chaos is the opposite and the inevitable supplementation of a system, and vice versa. Thus, a business organization as an object-system is a unity of system and chaos. At the same time, there can be no objects that are purely systemic or purely chaotic. The objects are always systemic in one respect and chaotic in another. When these respects (viewpoints, moments of time) change, the transitions "system → chaos", "chaos → system", "system → system", "chaos → chaos" are possible. We should bear a very important thing in mind – that this central synergetic problem does not take into account the many-sided symmetry of development and the subtle link between the symmetry and asymmetry of development. If we take this link into account, we can achieve quite significant results in understanding and planning the organizational changes. The systemic approach to the organizational transformations has great heuristic potential and is actively used by modern researchers for creating the organizational change models (Greiner, 2002; Guillar and Kelly, 2000; etc.). Application of their models requires a systemic diagnostic of an organization. The changes in strategy, production and technical base, technologies, and organizational structure gradually change people's values, attitudes and organizational behavior. This cannot but affect the changes in the employees' way of thinking. J. Duck rightly states that organizational changes can be successful, if a company pays as much attention to emotional, behavior aspects as to production ones (Duck, 2002). Extreme dynamism and increased velocity of change in socio-economic processes are typical for the modern market relations. This rather refers to the rates of changes in the models of agents' behavior than to structural changes. Social interaction becomes more and more separated by time and space, while knowledge becomes a factor that has a major impact on the transformation of economic institutions, organizational structures and existing models of human behavior. As a result, a person has to master organizational social relations and circumstances to adapt to economic and social reality. This may contradict to his/her values and mindsets and cause resistance to changes.

The final goal of organizational changes is moving from the actual state of the object-system to the state with advanced characteristics of the object-system. At that, an elaborated plan of organizational changes is needed, which would take into account the influence of many different factors on the situation. We should assess these multiple factors and make a decision about the frequency of the changes to be made. We should not be too slow in making organizational changes, when the external environment of a socio-economic system is dynamic and we need to respond quickly to consumers' demands and competitors' behavior. However,

frequent changes can lead the system to the state of chaos. Overcoming of this chaos will require the increased amount of various resources, i.e. a part of the resources will be spent unproductively to overcome the current state. The difference between the general consumption of resources and their reasonable value is the value of costs or economic losses. Special attention should be paid to the use of human resources, which may be involved in the process above the norm during the changes. This inevitably leads to physical and mental overload and dissatisfaction with the performed work. Therefore, the definition of the frequency of organizational changes is the optimizing task by the criterion of minimal economic losses.

To transform an object-system into a system, one has to define the optimal frequency of organizational changes or intervals of time, which provide less detrimental organizational changes, on the condition that the plan of changes is thoroughly elaborated and prepared. We propose to do it using a unique criterion: the sum of losses caused by changes U1 and losses of the market share due to the lack of timely changes and the reduction of company's competitiveness U2. In case of changes, the value U1 will be influenced, for instance, by the capital-output ratio of production in the enterprise or internal IITD. In this case, IITD1 > IITD2 > IITD3 etc., i.e. the larger IITD, the more expensive the equipment used in the enterprise's production and the higher the prime cost of the product. As for the state of the industry, it can be described by the level of technological development EITD. In this case, EITD1 > EITD2 > EITD3 etc., i.e. the larger EITD, the more dynamic the processes in the industry.

Different enterprises may have different combinations of IITD and EITD. Each i industry and each enterprise that conducts its activity in the i industry, have their own values IITD(i) and EITD(i). In this case, i=1,…, n; n is the number of industries; IITD(i) is the capital-output ratio of the enterprise's production process in the i industry; EITD(i) is the dynamics of processes in the enterprise's external environment in the i industry.

The value U1 reflects all the overheads that could be avoided. The less the interval between the beginning of the previous and the next change, the higher these overheads. Losses U1 occur, when the enterprises' employees have no time to perform current and new work with high quality. If the changes are poorly prepared, the volume of new work increases, and the efficiency of current work is reduced. But the new work or project will not increase the market share either; on the contrary, it is possible that they will diminish it. Thus, the shorter the period between the end of the previous change and the beginning of the next change, the higher these losses. For instance, if the changes are made every year (with the interval of one year), the value of losses will be much higher than if they are made at least every 2 years; this is due to lower productivity, idle storage of equipment, lower quality of products, and overlap of the works within the old and the new projects. If we make changes every three years, the losses will be lower. Thus, the dependence of damages on the frequency of changes will be descending. This is reflected in Fig. 1, i.e. U1(j) > U1(j+1) > U1(j+2), etc. Here, U1(j) is the value of damages, if the changes are made every j year (the axis x shows how often we should make changes: in 1 year, in 2 years or in 3 years), i.e. if we make changes annually and plan them poorly due to the lack of time, we will inevitably face chaos in performance. There are other losses of a different nature: U2(j) is the value of losses that occur when changes are not made every j year, (j+1) year, etc. j = 1, …, m. The longer the time interval between the end of the previous change and the beginning of the next change, the greater the losses due to the loss of competitiveness. This leads to the reduction of the market share, i.e. U2(j) < U2(j+1) < U2(j+2), etc.

Fig.1 presents the ascending function U2(j), dependences U1(j) and U2(j), and the sum of losses U:

$$U = U1(j) + U2(j), \quad (1)$$

which takes minimal values in case of a certain value j, which will take the optimal meaning jopt by this criterion (1).

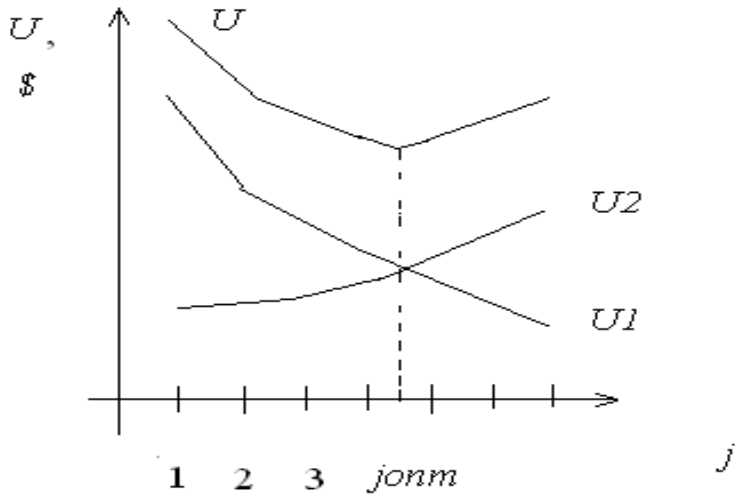

Fig.1. Ascending function U2(j), dependences U1(j) and U2(j), and the sum of losses U

Fig. 2 and Fig. 3 present the dependences U1(IITD) and U2(EITD) respectively.

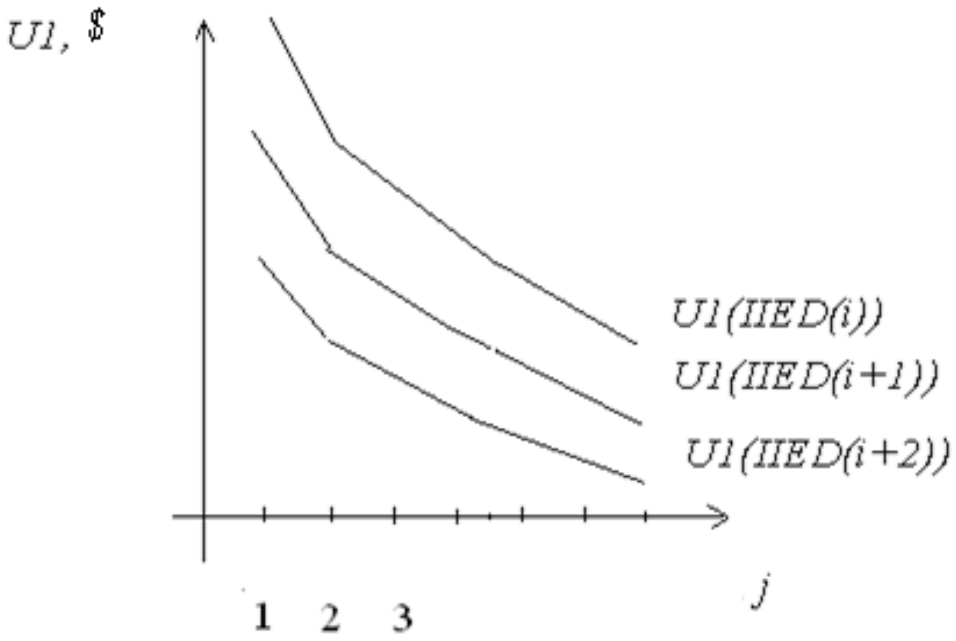

Fig. 2. Dependence U1(IITD)

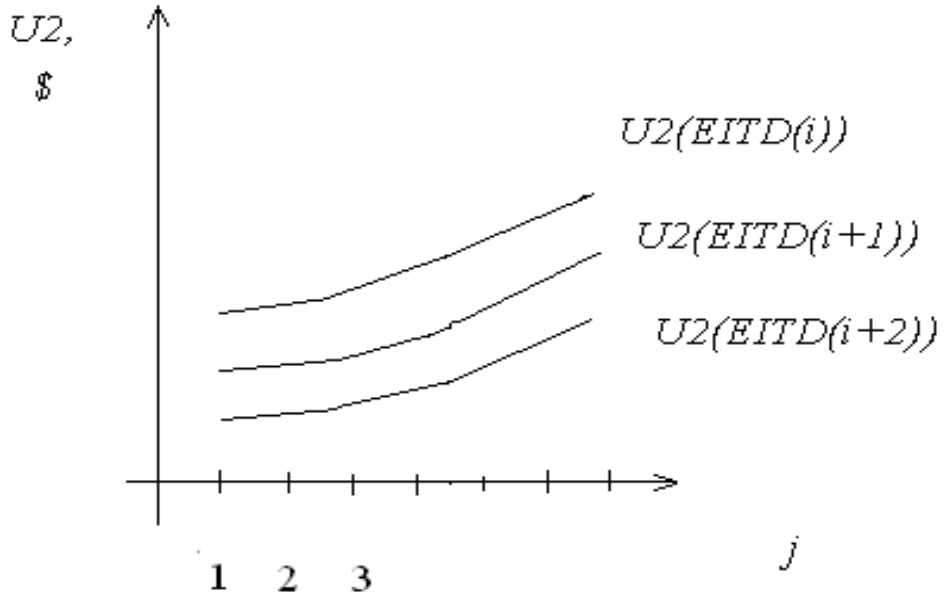

Fig. 3. Dependence U2(EITD)

Fig. 4 and Fig. 5 present the summative losses U1(IITD) for enterprises in various industries. We can see that the influence of the industry conditions is reflected on the value jopt. For the i industry in Fig.4, the optimal time interval for changes without losses is about five years. For the (i+2) industry in Fig. 5, jopt = 4 years.

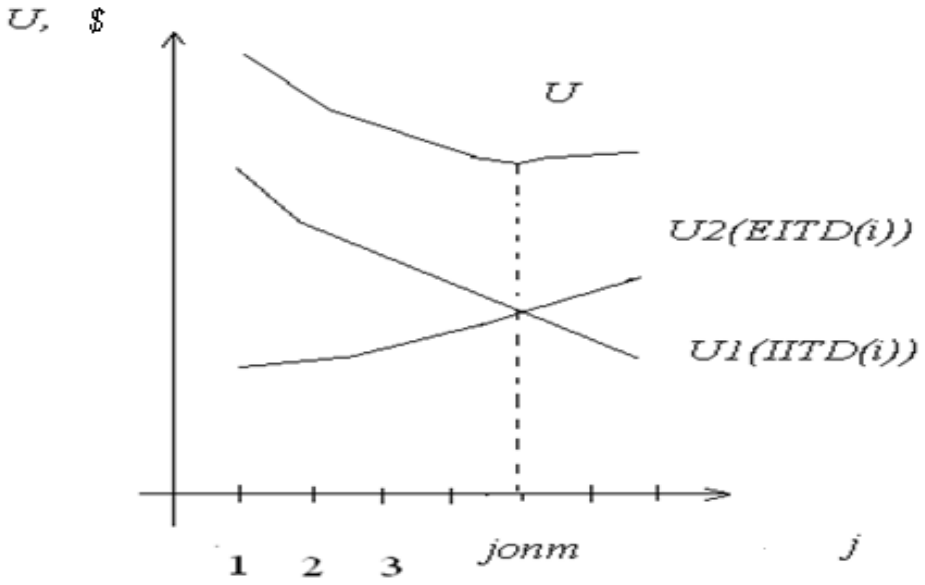

Fig. 4. Summative losses U1(IITD) for enterprises in i industry

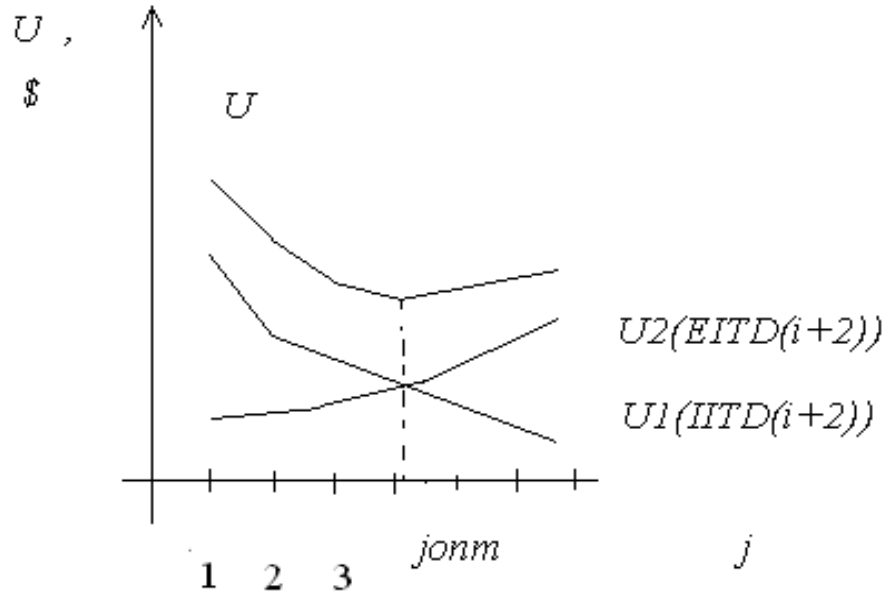

Fig. 5. Summative losses U1(IITD) for enterprises in (i+2) industry

Fig. 6 presents the impact of the volume of organizational changes M(l) assessed by the formula (2):

M(l) =Npch/Ntot. (2),

where Npch is the number of processes changed in the organization; Ntot is the total number of processes in the organization; l is the index of the volume of changes, l = 1,…, Ntot.

The volume of changes can be one of the factors to influence costs and, therefore, losses. The smaller number of processes changed in the organization, the quicker and the more frequent they can be implemented and the less resources and costs we need, and, therefore, the less losses we will have. Therefore, if M(1) < M(2) … < M(L), they can be quicker and less costly in case of M(1).

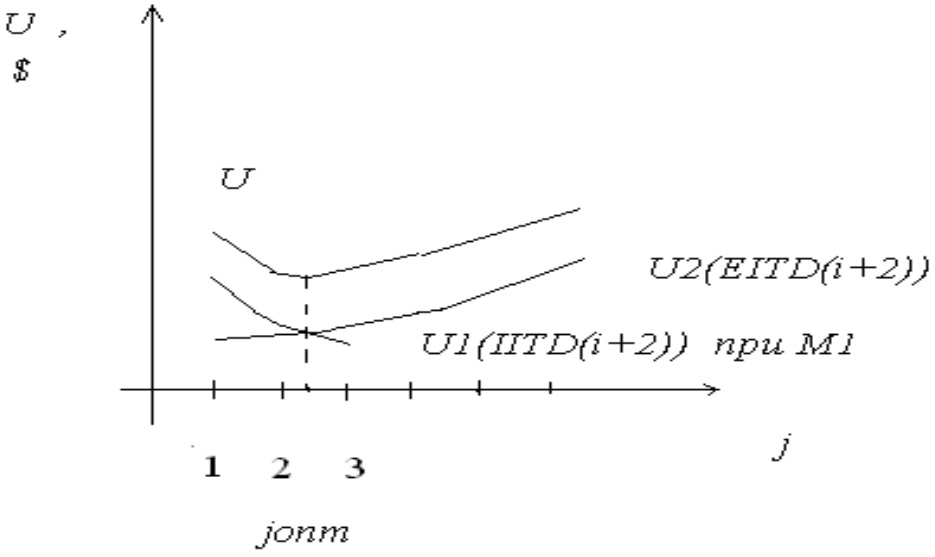

Fig. 6. Impact of the volume of organizational changes M(l)

In Fig. 6, in case of the volume of changes M1, the dependence of losses U1(IITD(i+2)) will be lower than in Fig. 5, where the losses are higher, since we assume that the volume of changes is larger here. In this case, losses from the decreased market share U2 (EITD (i+2)) remain almost the same. As a result, for the (i+2) industry in Fig. 6, jopt = 2.5 years.

Thus, we should take into account the volume of changes in defining their frequency. We can define the volume of changes, which should be implemented, by the need for financial resources. In this case, the processes should be completed and they should not contradict to the objectives of the organization. We can obtain additional resources, if necessary, by uniting the efforts of two enterprises to overcome a resource barrier. In this case, they can share the costs and losses. Besides, a synergetic effect enables to obtain some gain, which may reduce summative losses.

Here, we can identify three types of resource barriers. The first resource barrier occurs when a particular firm lacks resources for innovative projects implementation. In this case, the enterprises are united into holdings. The second resource barrier occurs when a firm lacks resources for large products either, and several large firms, sometimes together with the state, create temporary alliances to overcome it and to achieve their goals. The third resource barrier is overcome by the interim union of several states for especially large-scale projects.

The deficit of resources for organizational changes causes the employees' dissatisfaction with the quality of their work, since it distracts them from current activity and requires significant expenditures of individual working time to participate in the changes.

As was noted above, EITD(i) index reflects the dynamics of processes in the external environment of an enterprise of the i industry. The dynamics of processes can be measured by the velocity of change in the product range. World economy passes to the innovative type of development. Therefore, the velocity rate of innovative products coming to the market or the velocity of change in the product range becomes a disturbing factor for modern companies in the innovative industries. The organization potential is determined by the velocity of change in the product range. The velocity of change in the product range in the organization is defined as the occurrence of some key event (a new product or service) in a time unit, for example, in a year. The intervals between the occurrences of new models are uneven; therefore, we propose to define the average value of the velocity of change in the product range by the formula (3):

$$V_{aver} = \sum_{j=1}^{m} \frac{Mod_j}{(t_j - t_{j-1})} \qquad (3)$$

where is the number of new models occurred by the end of the year; is the number of recent years for which is calculated; is the moment of the last occurrence of a new model (accounting period); and is the moment of the first (the last but one) occurrence of a new model (basic period).

The higher the ability of the enterprise to correspond to the average value of this index in the industry, the higher its potential. The potential is available resources, which can be used for organizational changes and for the achievement of certain goals. The efficiency of resources depends on the employees' intellectual potential. The results of research (Bendikov and Jamai, 2001) enable to assess the value of intellectual capital (IC). IC consists of three elements: human capital, structural capital and consumer capital. The proposed index (the velocity of change in the product range) comprehensively describes the ability of human capital to innovations and the organizational efficiency of the structural capital. The structural capital reflects the company's organizational abilities to meet the market requirements and the ability to use them repeatedly to create new values. By measuring their value, one can define the competitive advantages of a firm, since it is important to know how much achieving of the index (3) will

cost. For example, the competing firm tries to achieve the value of the index (3) equal to that of the leader of the industry. For this purpose, it compares its index with the leader index by the formula (4):

$$\Delta V_{aver} = V_{aver1} - V_{aver2} \qquad (4)$$

where is the leader advance compared to the competing firm by the index (3); is the mean value of the velocity of changes in the leader's product range; is the mean value of the velocity of changes in the competing company's product range.

The competing firm can learn how much resources it will need to achieve the same level of the index as that of the leader. The larger the difference, the more resources a firm needs to achieve this level. The company may face a resource barrier. The influence of the resource barrier increases if the competitors use the strategy based on low costs. The value of the resource barrier for various companies will depend on the value of their IC. This is net current value of intangible assets () defined as a value that describes the company's ability to use intangible assets to be ahead of the competitors. After having defined of the leader, we should also assess of the competitor. Then, to define the value of the resource barrier by the intellectual capital, we should find the difference by the formula (5):

$$R_{\text{int}} = C_{IAL} - C_{IAPR} \qquad (5)$$

where is the value of a resource barrier ($), conditioned by the intellectual capital in the leading company. These are the financial resources that the competing firm needs to achieve the same level of development as the leading company; is the value of IC in the leading firm, $; is the value of IC in the competing firm, $.

A resource barrier is defined by both intangible and tangible assets. If the leading firm uses a new technology of development and manufacturing, which enables to perform new projects quickly and at the lowest cost, then the cost of the technology will be a resource barrier, too. This is the price paid for the technology necessary to approach the level of the leading firm.

In choosing the structural organization of the company, one should use the index of the time of launching a new model to the market by the leading firm in the i industry, calculated by the formula (6):

$$T_i = t_{ip} + t_{inn} \qquad (6)$$

where is the period of R&D, months; is the period of production preparation and direct manufacturing of products before marketing, months.

We should take into account the transaction costs, which are any costs associated with economic operations through the market (Efimov, 2001).

The more clients an organization has, the more consumer capital it possesses, since consumers are the company's wealth. The work by Bendikov and Jamai (2001) presents the instrument for defining its value.

To understand the essence of barriers, we can present the industry where firms work as hierarchically placed layers. The lower layer of the industry contains single companies with a low velocity of launching an innovative product to the market; the intermediate layer consists of the holding-type enterprises, which overcame the resource barriers due to unification and have quite a high velocity of launching new products to the market; the upper layer encompasses transnational strategic alliances and world systems of meta-corporations, which overcame resource barriers and, therefore, have a high velocity of launching new products to the marker and even create demand for them.

In reference with the above, we propose to supplement the existing notions "barriers of entering the industry" and "barriers of leaving the industry" with such notion as the "resource

barriers between the layers of industry". The resource barrier determines the value of financial investments necessary to provide high velocity of change in the product range. To enter a higher level (or to enter a certain industry), an enterprise should provide high velocity of changes in the product range. This is possible in case of substantial investments in the capital assets, technologies and personnel. To reduce the level of barriers, one should use and distribute the resources of a company so that the costs of goal achievement are minimal. The distribution and use of the resources underlie the organizational changes of the company, or of the structural organization in case of association between two or more companies.

If the company does not possess any significant resources, it has to remain at the previous level and struggle for its share of the market. However, if the company strives to overcome the resource barrier to reach a higher level of hierarchy in the industry, it can enter an integrated group. In this case, the management of the enterprise should model and investigate the function by the criteria: the value of market capitalization, the volume of sales, profitability, market share, return on common equity, etc. In this investigation, the mutual interest of firms should be taken into account. First, the company should assess its resources. Then, it should find a partner to cooperate in a complementary manner. This is the strategy of mutual supplementation of resources due to organizational realization: the company's available resources of a certain type are supplemented by another company's required resources of another type and vice versa. The structural organization of companies or the organizational changes should be associated with their resource components.

In 2014, a sociological research was conducted in the enterprises of a Russian region (Bashkortostan) which render economic services for the population. The method of the study was questioning survey. The research objective was to reveal the social problems in the course of organizational changes and realization of the enterprises' innovative potential (Kungurtseva, 2014; Bikmetov, 2014). The survey encompassed 350 persons including 27 managers, 46 specialists and office workers, and 227 manual workers. The sample was quota-type (quoted features were the labor type and gender). To assess the innovative potential, two criteria were identified: the first criterion is the source of innovative activity and its directions, i.e. the areas of innovations (equipment and technologies, organization and stimulation of labor) and their initiator; the second criterion was the employees' readiness for innovations in various spheres. From 48.6 to 50% of respondents answered that innovations were almost always initiated by managers. Most employees were sure that they could make proposals to their immediate superior or a top manager in the oral or written form. However, managers are often unavailable for contacts for a long time, or it is not customary to make proposals to their superior in the organization. This significantly reduces the number of ideas and proposals. Taking into account the results of the answers to a question "Who is the initiator of innovations?" and the possibility for the staff to make proposals to managers, one can make the following conclusion. At this stage of the enterprises' development, the employees are not ready to be the source of innovation; instead, they take the position of passive recipients who accept the changes from above. As shown by the study, 85% of the employees never proposed innovations or assumed that their work did not imply any innovations. Even among the rest 15%, most employees proposed innovations only once. Besides, many proposals were not implemented. Thus, the ability for innovations and initiative are not perceived by employees as a quality that is necessary in professional activity, and therefore will have a negative influence on the content, velocity and rates of change. The culture of change management should alter slightly faster than organizational relations. Those who transform innovations into results by their practical activity have more opportunities for these changes. The society is constantly changing and managers are not always capable of noticing the tendencies of organization development. In this respect, the managers should try to assess their efforts and results adequately to reality. Taking the

principle of trust into account in the organizational change management enables to study changes not only in the internal and external social environment of the organization, but also in the social and psychological structure of employee personality. The employee personality is the central element of the dynamic process of changes. The personality is not only a factor of social development, but also the main consumer of its results and achievements. The authors of the human development concept adopted by the UNO in 1990 treat this development as the enlargement of the specter and possibilities of intellectual, social, economic and political choice available for every member of the society. "The goal of development is to create favorable conditions to make people's life long, healthy and full of creation. People often forget about this simple though important truth in their pursuit of material and financial benefits." (UNDP, 1990)

CONCLUSIONS

The paper proposes a solution to a new task – to define the time intervals between changes or the optimal moment to begin the next change. In a climate of the dynamic external environment of a socio-economic system, one needs to respond quickly to consumers' demands and competitors' behavior. To preserve the enterprise's market share in case of retardation and to avoid losses, managers often make unreasonable decisions to implement a large number of consequent innovations. However, frequent changes can lead the system to the state of chaos. To overcome the chaos, the enterprise has to use various resources more intensively, i.e. it spends resources unproductively to overcome the current state. The desire to solve this problem determined the content of the proposed criterion for assessing the optimal interval between subsequent changes in a socio-economic system: a sum of losses caused by the changes and losses of the market share due to the lack of timely changes and to the reduction of company's competitiveness. The solution of this problem implies that the factors of internal environment (for example, the value of the assets, the state and attitude of the employees) and the external environment of a socio-economic system (the level of technological development of the industry) are taken into account. The volume of changes is one of the most important factors that influence the duration of intervals between them. The larger the volume of changes in the object-system, the more resources are needed. Therefore, the interval between changes should be enlarged to enable managers to search for necessary resources and to provide trust in the interaction with internal and external social organizational environment.

Organizational changes depend on the dynamics of external environment that defines their volume. The dynamics of external environment, in turn, is largely determined by the velocity of change in the competing firms' product range. The stronger the competition in the industry, the larger the organizational changes that require a lot of various resources. Mobilization of resources is the main condition for achieving the company's goal – that is, reducing the backlog or increasing the gap to get ahead of the leading firm.

Coping with resource barriers enables the company to provide higher velocity of change in the product range and creates conditions for efficient organizational changes. Managers' knowledge of and taking into account the content of the resource barriers between the industry layers allow diagnosing the situation in the industry and making organizational changes in the company. This enables (if necessary) to overcome higher barriers that require significant expenditures (resources) and to choose the form of business association that will provide high velocity of change in the product range.

An interval between changes should be enlarged in order to enable managers to search for the necessary resources and to provide trust in the interaction with internal and external social organizational environment. Knowledge of these factors enables to make the managerial decision which takes into account the specific features of the system per se and its supersystem.

Conflict of interest

The authors claim that the information contained herein does not pose any conflict of interests.

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