“Emergence of synergetic effect in creation of collaborative alliances in natural resource management”

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Emergence of synergetic effect in creation of collaborative alliances in natural resource management

Abstract

Based on the theoretical method of generalizing the views of scientists on the essence of the "synergy" concept, the authors of the article have examined the content and essence of the concept "synergetic effect" in the article. The concept of "collaborative social responsibility" was defined during the formation of collaborative alliances in the "state-local communities-extracting enterprise" system. The authors have determined the formation of a synergetic effect in the natural resource management in the conditions of collaborative alliances and it was suggested to assess the synergetic effect from the collaborative alliance interaction in the natural resource management through the analysis of "benefits and costs".

Keywords: collaborative alliance, natural resources, synergy, synergy effect, effect of collaborative alliances.
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Introduction

Given the trends of globalization and increased competition between the enterprises, the transformation processes currently taking place in the Ukrainian economy lead to the need for cooperation and the creation of various forms of vertical integration structures.

Cooperating among themselves, firms increasingly form alliances that open up the enormous opportunities for the enterprises. The enterprises with sustainable local market positions may be enabled by the alliance to have enhanced competitive advantages through the advanced management experience and technologies, as well as to improve the production base and the distribution system. The alliance may be the only opportunity (excluding direct sales) to survive in a situation where the domestic market is open to foreign competitors, owning global brands or advanced technologies (I. V. Yatskevich, 2012). Thus, taking into account the current economic trends, the implementation of the proposed collaborative mechanism is a promising direction. The functioning mechanism of the collaborative alliances in the environmental management is primarily the coordination of the parties' interests in the redistribution of rental income among all parties (state – local communities – extractive enterprise).

The purpose of these alliances is often the desire of their participants to get or enhance the synergy effect. This effect is often replaced by the notion of economic effect, which is a predictable result of a systematically organized integration process, and, unlike the synergy effect (synergy), is predictable.

1. Analysis of recent researches and publications

The papers of many foreign and Ukrainian scientists are devoted to the problems discussed in the article. This confirms the fact that in recent years, the scientific interest in synergy as a phenomenon is constantly rising. The term synergy comes from the Greek synergeia – cooperation, community. For the first time the term "synergy" was introduced by a German scientist H. Hacken to explain the cooperative behavior of thermodynamic systems in 1970. There is also the opinion that for the first time the term "synergy" was introduced more than a hundred years ago by the English physiologist C. Sherrington. It is believed that the term "synergy" was introduced into circulation by I. Ansoff in the economic science to justify group structures in the company's organization. The development of synergy as a science and the definition of the synergy essence were considered in their writings by such scholars as A. Lyukshinov (2000), L. Melnyk (2005), A. Grinev (2004). The problems of determining the synergy effect and consideration of synergy types in the integration processes became the subject of research in the scientific works of S. M. Ishchenko (2007), E. Knyazeva (2005), S. Kurdyumov (2005), V. Marchenko (2011). The issues of the synergy effect emergence in creating an alliance were researched by such economists as I. Vladimirova (1999), B. Garett (2002), A. Dolgorukov (2004), A. Zobov (2005), E. Karasyuk (2004), P. Ki (2006). However, these studies are devoted only to the essence, formation and development of alliances.

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A. Lyukshinov considers synergy as a reaction to the combined effect of two or more factors, which is characterized by the fact that this action is exceeded by the action given by each factor separately. Synergy is also considered as the effect (result) of co-operative, coherent (coordinated in time and space) behavior of elements in the system. (Knyazeva, Kurdyumov, 2005). Other authors believe that the synergy arises as added value, when the company (firms) merges (Knyazeva, Kurdyumov, 2005). There are also views on synergy as a reaction of action Y. Ishchenko (2007), or the factor of influence on the system potential, where significant potential strengthening or weakening of any system, which can cause both sharply positive and sharply negative consequences (Grinyov, 2004). There is no single generally accepted economic definition of this phenomenon. The modern authors, dealing with synergy in their works, describe it as a phenomenon in which 2 + 2 is rather 5 or 6 than 4. After such a characteristic, synergism is usually interpreted from the point of view of the subject or phenomenon that is currently interesting for the scientists.

In our opinion, all the above definitions have the right to exist and reflect the inherent synergy features. Each of the concepts has some disadvantages and advantages, and can be applied in certain management conditions of vertically integrated structures. At the same time, all authors agree that the combined involvement of several mutually agreed elements of the system (companies, enterprises, business units, vertically integrated structure) enables to receive a general effect that does not equal to the sum of the effects received from the isolated operation of each system element. In addition, it is noted in the scientific papers that it is rather difficult to estimate and predict the synergy effect, which is due to its non-linearity, as well as some uncertainty and unpredictability of the system functioning.

The purpose of this study is to investigate the synergy effect formation when creating the collaborative alliances in the environmental management.

2. Main part

One of the main principles of effective development is the rational use of resources, which is achieved by forming the synergy effect at the enterprise. The synergy effect is the effect of the joint action of all system elements, which leads to an increase in the qualitative performance without increasing the quantitative ones. This is explained by the fact that the enterprise, as an open system, is both material and informational and informational and material essence. As material and informational essence, it exists for the maintenance of material basis of the system. This involves the material and energy exchanges of the system with the environment and between individual parts of the system, as well as information control over the flows of material substances in space and time. As information and material essence, the system exists for the implementation of information functions of the system, that is, the activities of its information basis. The information functions include information communication between individual components of the system. Thus, we can say that the informational basis serves material essence, and the material basis serves informational essence (D. Kolesnikov, 2013). However, an effective and durable alliance occurs in cases where not only the main and financial funds of participants, but their business knowledge and managerial skills are subject to merger. The success of alliances is also largely dependent on long-term planning, policy coordination, degree of trust, desire for cooperation between higher and middle management of participants, provision of “financial protection”, that is, permanent and reliable sources of financial resources, similarity of cultures and mutual understanding of its participants to receive maximum synergy from their interaction.

A. Zub notes that the alliance synergy arises due to the efficient merging of knowledge, skills, financial means, technologies, infrastructure, production means, etc. It can be noted that the alliance synergy arises when mobilizing the benefits of the participants. The member partners can evaluate synergy through the analysis of benefits and costs, which involves the calculation of all significant costs and benefits arising from each choice made, usually on the basis of non-economic considerations (for example, in terms of strategic benefits of a solution) and their subsequent summation over a certain period of time (for example, during the next year). The analysis involves “objective” quantitative evaluation for each choice.

Taking into account the specifics of our research, namely, the synergy emergence in the environmental management, we agree with the authors that the enterprise’s synergy is a factor of its “value”, which enables the enterprise subdivisions or business units (V. Avilova, 1994) to reach a higher level of profit (or another efficiency indicator) than they have had when functioning separately.

The synergy concept in the economic systems is associated with a proportionality violation. Sometimes synergy is called “2 + 2 = 5” effect, in

order to emphasize that the enterprise is searching for such resource-production and product-market combinations in which the amount effect exceeds the amount of constituent elements. In this case, there is an additional effect unit (1 = 5-4) due to synergy or synergy effect.

Thus, we agree with the definition that the synergy effect is an increase in the enterprise performance as a result of association, integration, merging of individual parts into a single system, where the effect from the element interaction of the enterprise system exceeds the amount of effects of each element separately. That is, this is an additional result obtained from the close coordinated interaction of individual system elements. It should be noted that this effect can be both positive and negative. "With a low system organization, the sum of its properties will be less than the sum of component properties" (V. Marchenko, 2011).

However, when creating the collaborative alliances in environmental management, the synergistic effect is a part of the collaborative effect in environmental management. That is, the collaborative effect in the environmental management is the result of interaction between the collaborative alliance participants on the activities of each of them, which includes a synergy interaction result between the parties and increases the overall alliance performance.

At the same time, synergy is the added value created by merging several firms or structures, creating opportunities that would not be available to those firms or structures that operate independently.

A. T. Zub proposes to evaluate the effect that arises when combining the interests of several firms through the benefits and costs analysis. It is so, because this method involves examining the quantitative and qualitative indicators of costs and the total benefits of the available solution options for each participant in the collaborative alliance. (Benefits and costs analysis, other names – "costs – results", "utility – costs", "costs – profits") is a rational method of decision-making. It was based on the concept of rational choice, according to which the individuals choose an alternative with benefits that exceed costs.

Other authors argue that a general organization synergy effect is achieved through a coherent interaction between the individual units of the organization, or rather, between the managing employees of the units that form a group of managers of the same rank and provide the continuity and efficiency of the overall functional process. In this sense, we can talk about managerial synergy (Y. Kapitanets, 2010). An increase in the company management efficiency is observed, first of all, in the presence of managerial synergy – a coordinated team interaction between the heads of different units and different levels of management. Compliance with the regulatory standards is also a prerequisite for synergy and team-building. In this regard, the index of compliance with them can be a control factor:

$$K_n = \frac{U_f}{U_n}, \quad (1)$$

where U_n – control span;

U_f – actual level of the number of subordinates per manager.

Thus, if the management manages to create a solid production structure in which all the components of the production process act in a coordinated and purposeful manner, that is, synergistically, taking into account the requirements and nature of the environment, the stability of such an enterprise will be a reflection of its competitiveness in the market.

Another group of authors notes that synergy can also be seen as the coherence of individual production internal and external components. The presence of a certain level of net profit acts as the main economic indicator of the synergistic effect. A benchmark that enables to determine whether a sufficient amount of net profit is received is the profitability, as well as the nature of profitability and net profit dynamics. The same criteria can be used to determine the competitiveness level of the enterprise. In addition, it is appropriate to hold the identity: synergy within the company = competitiveness in the external environment (P. Kit, 2016).

In our study, we decided to use the method of benefits and costs analysis, which is universal for any economic decisions (that is, decisions on the limited resource distribution) that are accepted by both the separate economic entities (firms and households) and the state.

The benefits and costs analysis (BCA) is sometimes considered only in the narrow sense as a method of assessing the effectiveness of investment projects implemented in the public sector (L. Melnik, 2010; I. Yatskevich, 2014). It is expedient to use BCA in assessing the alliance synergy effect, that is, it is possible to carry out a quantitative analysis (quantify the benefits of future participants in the alliance formation) of a particular type of alliance. In this case, the alliance is understood as an action plan aimed at achieving certain goals of the participants.

The main stages of BCA in the alliance formation and the directions of achieving the specific goals of the member partners are as follows:

1. Determination of the analysis level depending on the type of activity of the alliance member partner (strategic, procurement, international, educational, industrial, scientific, technical, and sectoral), that is, it is necessary to determine what kind of benefits and costs to be taken into account when forming the alliance.

2. Identification of the alternatives available. A thorough benefits and costs analysis is possible only if all alternatives are considered. The alternatives may be multidimensional (decision making on the alliance formation or its rejection, immediate implementation or postponement for the future, resource composition to be used by the member partners, ways of use and distribution of results, etc.). The number of alternatives can be extremely large, so it's important to limit the realistic number of the most important alternatives.

3. Determination of the list of consequences of making a decision on the alliance formation and to choose the method of quantitative measurement of each of the consequences. The consequences include the amount of resources that should be spent to implement the goal and the interaction results that can be expressed in increasing the types of products available for use by the consumers (works, services, natural resources, time), improving the quality and availability of products (works, services).

4. Quantitative evaluation of each of the consequences. At the stage of quantitative evaluation, it is important to adequately and realistically determine the quantitative indicators for each of the consequences, to make a separate calculation for each goal of the member partner of the alliance.

5. Assignment of cost estimates for each of the expected outcomes. It is about the need to bring all the consequences to a single cost measure. Only under this condition, it is possible to weigh the costs and benefits and to make a quantitative evaluation of the interaction effectiveness of the member partners of the alliance.

6. Determination of current cost of benefits and costs. A simple summing-up of cost estimates of the interaction consequences of the member partners of the alliance cannot give a true result, because the time when certain benefits and costs arise – now or in the future – is significant for each member partner. The necessary analysis stage is the combination of benefits and costs in time or the calculation of present value (discounting) of future benefits and costs. This involves determining the discount rate.

7. Summing up of current values of benefits and costs to determine the net present value of the decision on alliance formation. The net present value in the benefits and costs analysis is a measure of net benefits of the alliance member partners. There must be chosen the alternative, which provides the greatest net present value.

8. Analysis of sensitivity. Member partners interaction analysis is the assessment of future benefits and costs that cannot be determined precisely, because they depend on a large number of random factors. The sensitivity analysis involves calculating the impact of various random factors on the net present value of the decision on alliance formation. In addition, it is important to carry out a sensitivity analysis regarding cost estimates for benefits and costs, as well as the discount rates.

9. Implementation of the benefits interaction analysis of the member partners interaction and calculation (if necessary) of the weighted estimates of the alliance formation effectiveness.

According to I. Yatskevich, the collaborative alliance members should make a quantitative assessment of the benefits and costs and compare the benefits and costs in time. At the same time, the alliance members have a problem with the analysis of decisions on the alliance formation and functioning (how to quantify the value of various benefits and costs). This problem can be solved by two approaches chosen by the heads of enterprises that are involved in the alliance formation. Firstly, it is necessary to determine how the alliance functioning will affect the activities of each alliance member. To answer this question, the enterprise heads need to rely on assessment of the activity performance change from the perspective of each alliance member.

Our analysis of the authors' research conducted in the world allows us to conclude that the combined attraction of several mutually agreed elements of the system (companies, enterprises, business units, vertically integrated structure) positively affects the functioning of each element of the system. In addition, in scientific papers, it is noted that the synergetic effect is difficult to estimate, which is due to its nonlinearity, as well as certain uncertainty and unpredictability of the functioning of the elements of the system.

We propose a scientific methodological approach to determining the magnitude of the synergistic effect

of the interaction of the collaborative alliance participants of the extraction of natural resources, which allows us to determine the share of the socioeconomic effect of interaction that is due to synergy and is based on the "benefits and costs" method. The result has shown that the increase in the effectiveness of the activity associated with the functioning of the alliance, where the effect should be redistributed among the alliance members, or when analyzing the decisions of the alliance members, should in a certain way estimate the percentage increase in the effectiveness of the activity for each member of the alliance.

The effect that arises when joining the interests of the members of the collaborative alliance is proposed to be assessed using the "benefits and costs" method. This method involves examining the quantitative and qualitative cost indices and the overall benefits of the available options for each participant in the collaborative alliance. That is, the creation of a collaborative alliance will have economic meaning when there is reason to expect that the market value of the capital of the participants will be greater and the risks are less than before the creation of the alliance.

$$\Sigma_{i=1}^{n} E'k > E'r + E'ke\,, \qquad (2)$$

where *Ek'i* is the effect of every *i*-th member of the alliance: the state, the extractive enterprise and the region of extraction of natural resources; correspondingly *Ek's; Ek'r; Ek'e* – are the economic result of each participant in the collaborative alliance (state (s), region (r), extraction enterprise (e)).

To determine the synergistic effect of the collaborative alliance in the state-region-enterprise system, the following formula is proposed (Fig. 1).

$$EZR = \Sigma_{i=1}^{n} E'k - (Zs + Zr + Ze), \qquad (3)$$

EZR is a summary indicator of the synergistic effect of the functioning of the collaborative alliance;

Zs, Zr, Ze are the costs for each participant in the collaborative alliance.

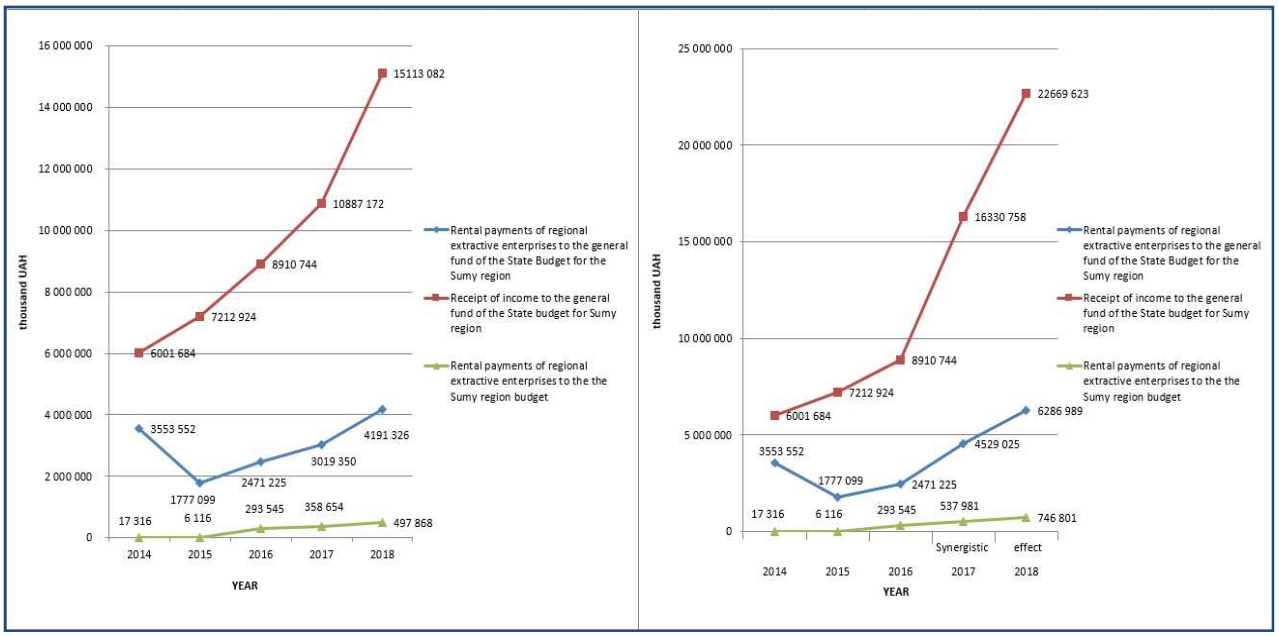

Fig. 1. Determination action of the synergistic effect of the collaborative alliance in the state-region-enterprise system

The conducted research showed that in the case of creating a collaborative alliance, the synergistic effect of its functioning increases the overall result by 15%. The specificity of the functioning of the synergetic alliance is due to the cyclicality of the generating rent-forming processes at the enterprise, region and at the state level.

The second way to determine the performance for each alliance member is to find the answer to the question: how much each alliance participant will agree to pay for obtaining certain benefits or to avoid any costs? In this case, there are no fundamental units of measurement (money, certain real benefits, strengthening of competitive positions in the market, increasing the number of consumers, improving the brand, etc.). The problem is in determining the value of certain benefits and costs for each alliance member based on their business activity in the market (that is, based on decisions taken by the alliance members).

As noted by I. Yatskevich, in an ideal world with perfectly competitive markets, in the absence of

factors of market failure and state intervention, market prices answer to this question, but in real life, market prices do not reflect the efficiency of enterprises.

Conclusion

The synergy study as a phenomenon capable of increasing the positive effect of a corporation or an enterprise functioning is very relevant in the modern period. Competition has long gone beyond the product manufactured and moved into the competition field of management structures.

However, the effective and durable alliances occur in cases where not only the main and financial funds of participants, but their business knowledge and managerial skills are subject to merger. The alliance success also depends largely on long-term planning, policy coordination, degree of trust, and the willingness to cooperate by the senior and middle management.

The implementation of collaborative mechanism is a promising direction in creating a socially oriented system for the formation of collaborative social responsibility through the redistribution of rental income from the extraction of natural resources. The functioning mechanism of the collaborative alliances in the environmental management is primarily the coordination of the parties' interests in the redistribution of rental income among all parties (state – local communities – extractive enterprise).

If all the collaborative alliance participants work honestly and transparently, then society will get synergy effect as a collaborative social responsibility.

We propose to evaluate the synergy effect of collaborative alliances in the environmental management through the analysis of benefits and costs in this work. Of course, a performance increase associated with a certain decision on the alliance formation and functioning should be redistributed by the alliance members; or when analyzing the decisions, the alliance members should determine the performance increase percentage for each alliance member in a certain way. A rational assessment of the alliance formation and functioning is impossible without a clear definition of whether the benefits of each alliance member will be achieved in order to achieve certain goals of the members, whether it is necessary to take into account the different value of an additional unit of benefits for each alliance member, depending on what they are willing to obtain.

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