

## **A Sustainable Socio-Economic System Model Leveraging AGILE Management Technologies for Fostering Innovations**



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### **ABSTRACT**

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The primary objective of this study is to explore the potential of AGILE management technologies in facilitating innovation within the framework of a sustainable socio-economic system. Investigating the sustainable development of the socio-economic system, the research focuses on devising a model that incorporates AGILE management technologies to foster innovation in accordance with the principles of sustainable development. Utilizing state-of-the-art decomposition modeling methods, the research methodology encompasses the development of a goal tree, a context diagram, and a fundamental decomposition. The novelty of this study lies in the introduction of an innovative methodological approach that integrates AGILE management technologies with the sustainable development of the socio-economic system. A limitation of this study is the exclusive focus on AGILE management technologies within the context of socio-economic system sustainability. Future research endeavors should explore the potential of personnel management in promoting innovation within the sustainable development framework.

## **1. INTRODUCTION**

The key group in the composition of innovations from the standpoint of sustainable development is the innovation of new technologies for managing the socio-economic system, represented by innovations in goods and services (innovation-product) or in technology (innovation-process). They are the basis for meeting the growing needs of society, increasing production efficiency, changing models and generations of technology and management.

At the present stage of development of innovative technologies and management, issues that are at the crossroads of these two industries are becoming increasingly popular. In particular, concerning the reorganization of the structure within the company, increasing productivity, less problematic adaptation of the company to external changes. As well as creating a flexible type of team, where changes and reorientation of the workflow will be painless. The Agile methodology helps to find answers to these questions and contribute to the sustainable development of any socio-economic system.

Along with the acclaim and regular press coverage, there is a lot of criticism of the Agile methodology. In particular, one of its main principles is the absence of a "road map" - none of the direct participants in the project has clear information

about the final product. All team members work short distances and work closely with customers. The latter, in turn, can change the strategy partially or completely in the process of creating the final product. Often such actions lead to a complete transformation of an existing product.

The following core values were proclaimed in the Agile manifesto: people and interaction are more important than processes and documents; a working product is more important than a large amount of documentation on it; close contact with the customer is more important than strict adherence to the contract; adaptability and the ability to change are more important than sticking to the original plan.

Whether you need to implement Agile can only be said after a complete analysis of the company's work and a clear understanding that this is not a must do for everyone and is not a panacea for all previous unsuccessful attempts to change something within the team. When deciding to follow the principles of Agile, it should be remembered that they mainly involve the transformation of corporate culture and way of thinking.

The improvement of the organization's business processes is associated with the improvement of activities, the formation of effective management systems and processes, especially the organization's policy in the field of quality, rational use of resources, increasing the responsibility of management, social

responsibility of the organization, etc. The modern knowledge economy puts forward high demands on the effectiveness of behavioral models. The role of the human factor in the production system is becoming more and more obvious. The previously prevailing technocratic approach to personnel management has lost its position. The concept of human capital is introduced into scientific circulation; the essence of the organization's policy that stimulates the retention of employees of the organization is revealed; the need for effective human resource planning is recognized; the objectives of performance management are substantiated, etc. Real recognition of the role of the human factor in organizational processes is required.

The quality of management is still based on the effectiveness of the implementation of strategic, systemic, process, administrative, regulatory, situational, marketing, etc. approaches to managing an organization. However, the growing importance of the behavioral approach in managing the quality of business processes and human resources of an organization is becoming more and more obvious. Recognition of the role of the behavioral approach will provide the deepest qualitative changes at the personal and collective level of labor organization, increase the level of adaptability and competitiveness of the organization in modern socio-economic conditions. The main problem of the organization's management is related to the underestimation or ignoring of behavioral aspects in modern business processes. Employees are a powerful intangible capital of the organization. Increasing the productivity of this capital requires updating approaches to managing organizational behavior, creating effective models of professional activity and improving communication interactions in modern business processes. All this actualizes the study of Agile - management to ensure sustainable development and effective innovation.

The main purpose of the article is to find ways to ensure innovation with the help of AGILE-management technologies in the context of sustainable development of the socio-economic system. The object of the study is the system of sustainable development of the socio-economic system.

The innovativeness of the article is presented in the presentation of a new methodological approach to ensuring innovation with the help of AGILE-management technologies in the context of the sustainable development of the socio-economic system.

## 2. LITERATURE REVIEW

The global sustainable development of the developed countries of the world is based on the introduction of modern innovative information and communication technologies, which are dynamically changing based on the accelerated development of new products. This requires the compression of innovation lifecycles on the principle of "faster – more powerful – cheaper". In such conditions, there is a need for continuous improvement of approaches to innovation management in the context of sustainable development [1, 2].

Researchers [3-5] evaluate the features of Agile management in different ways. In particular, the disadvantages of the methodology include the unpredictability of decision-making, but the advantages are maximum adaptability and focus on employees. It involves the implementation of tasks in small (up to nine people), but close-knit teams in which participants closely cooperate and interact with each other.

However, the size of the team depends on the human factor. Many managerial problems make it necessary to establish interaction between team members. In an Agile team, the project manager defines the relationships between roles to ensure effective coordination and control of the project and promote sustainability. The human factor in such teams is decisive. The psychology of collective interaction is important, linking, for example, the complexity of decision-making and the effectiveness of information exchange with the number of employees in the team. Therefore, it is important that every team member understands what the team is doing. Employees must be highly motivated and guided by moral values. "Personnel feel belonging to a company or team if there is a group project, social activities and well-being. Recognition and evaluation of work, promotion and assignment to work is the achievement of respect. Knowing that people achieve the best results with the appropriate level of respect and self-actualization, Agile management focuses on achieving and ensuring a high level of satisfaction for the needs of each team member [6, 7].

Summarizing the approaches of Agile management to ensure sustainable development, scientists draw a conclusion about its specificity, with regard to the value-based nature of management. After all, the success of Agile management has its own mechanisms, which include: leadership development; culture of learning; self-organization of small teams; control over the results by the employees themselves; diversification of teams (presence of different people according to individual characteristics); accessibility of managers to business information; unity of principles, goals and values [8-11]. Together, these are the attributes of a flexible modern management that will allow sustainable development.

However, given the scientific attention to this issue, our study is relevant and new, because the control system is constantly changing with the dynamics of time. Ensuring sustainable development must adapt to new changes in the external environment.

Compared with our study, it should be noted that we set a completely different scientific problem in our article. The scientific task is to form a model for ensuring innovation with the help of AGILE-management technologies in the context of sustainable development of the socio-economic system.

## 3. METHODOLOGY

World experience shows that the introduction of new management methods in the socio-economic system should be preceded by a serious functional and information survey in order to determine the optimality of processes, the distribution of resources between functions. The sustainable development model resulting from such a survey can be generated using various tools. Consideration should be given to modeling technology using CASE tools - Ramus Education. The implementation of modeling in Ramus Education is based on the IDEF0 methodology, which has the status of a sustainable development standard in the United States. IDEF0 is part of the IDEF family of methodologies that allow you to explore the structure, parameters and characteristics of any socio-economic systems. The IDEF0 method is intended for functional modeling, that is, modeling the performance of an object's functions by creating a descriptive graphical model showing what is done, how and by whom within the framework of functioning and ensuring sustainable

development. A functional model is a structured representation of the functions of a socio-economic system or environment, information and objects linking these functions.

In the study of the methodology of functional modeling of complex socio-economic systems of a modular type, the conceptual provisions of the IDEF0 methodology were taken as the basis, applied to complex systems built according to the modular principle, which means building complex systems with different characteristics by arranging them from typical modules of a limited range.

When using the IDEF0 methodology, we adhered to a set of strict formal rules that provide the advantages of the methodology of unambiguity, accuracy and integrity of complex multi-level systems. Model development in IDEF0 is an iterative procedure. At each step of the iteration, we, as a developer, offer a version of the model, which is subjected to discussion and subsequent editing, after which the cycle repeats.

The components of the syntax of the IDEF0 language are blocks, arrows, diagrams, rules. Blocks are functions defined as an activity, process, operation, action, or transformation. Arrows represent data or material objects associated with functions. The rules define how the components should be applied. Diagrams provide a format for graphical and verbal description of the sustainable development model.

The graphic diagram is the main component of the model, containing blocks, arrows, connection of blocks and arrows. The diagram is a unit of system description and is placed on a separate sheet. Blocks represent the main functions of the modeled object. These functions can be decomposed into components and presented in the form of more detailed diagrams. The decomposition process continues until the object is described at the level of detail necessary to achieve the goals of a particular project. The top-level diagram provides the most general or abstract description of the modeling object. This diagram is followed by a series of child diagrams that provide a more detailed view of the object. Our modeling will consist of a sustainability context diagram, a basic decomposition, and tree nodes with stages represented.

#### 4. RESULTS OF RESEARCH

The Agile Manifesto serves more as a guide to what Agile is and how to use it than a methodological prescription. The

values and principles of AgileManifesto mean adapting to each specific situation. Therefore, Agile is embodied in different frameworks. One of the most popular among them is Scrum. It is the integration of this technology that will be the focus of our modeling for the socio-economic system that we have chosen as an example: Shobeli LLC, which develops and implements modern, innovative projects in the European market.

The A0-Implementation of Agile management technologies to ensure sustainable development achievement node tree is shown in Figure 1.

The next step will be the formation of a context diagram to ensure the achievement of A0-Implementation of Agile management technologies to ensure sustainable development (Figure 2).

And as a final result, the main decomposition of A0-Implementation of Agile management technology to ensure sustainable development should be formed (Figure 3).

Consider the proposed steps in more detail. The characteristics of each stage of achieving A0-Implementation of Agile management technology to ensure sustainable development are presented below:

A1. Use of Scrum technology. Scrum is management, according to which one or more functional self-organized teams create a product in stages. The best teams are those that have seven people in their professional environment. Scrum is widely used and will be used as a methodology in various business industries for the successful development of various projects. In turn, the flexible and adaptive Agile model is a conceptual framework within which software development is carried out.

A2. Implementation of the Scrum Master methodology. The Scrum Master is responsible for the success of Scrum on a project. Essentially, the Scrum Master is the interface between management and the team. As a rule, this role in the project is played by the project manager or team leader (lead developer, team leader). It is important to remember that the Scrum Master does not hand out tasks to team members because Agile teams are self-organizing and self-managing. The main responsibilities of the Scrum Master are an atmosphere of trust, the search for product values, the removal of obstacles, adherence to practices and process in a team, enhanced learning at all stages, and expanding the vision of visible problems and open questions to ensure sustainable development.

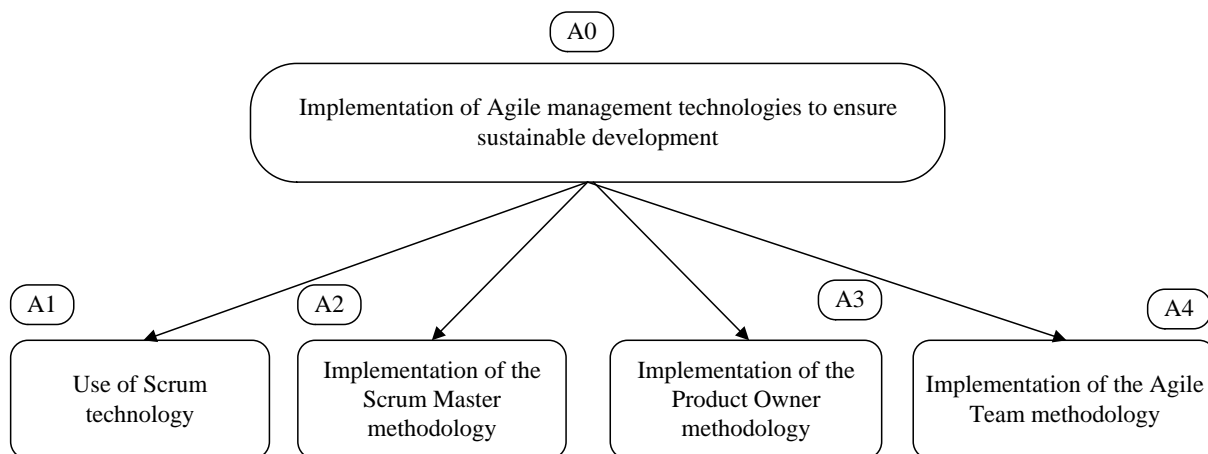
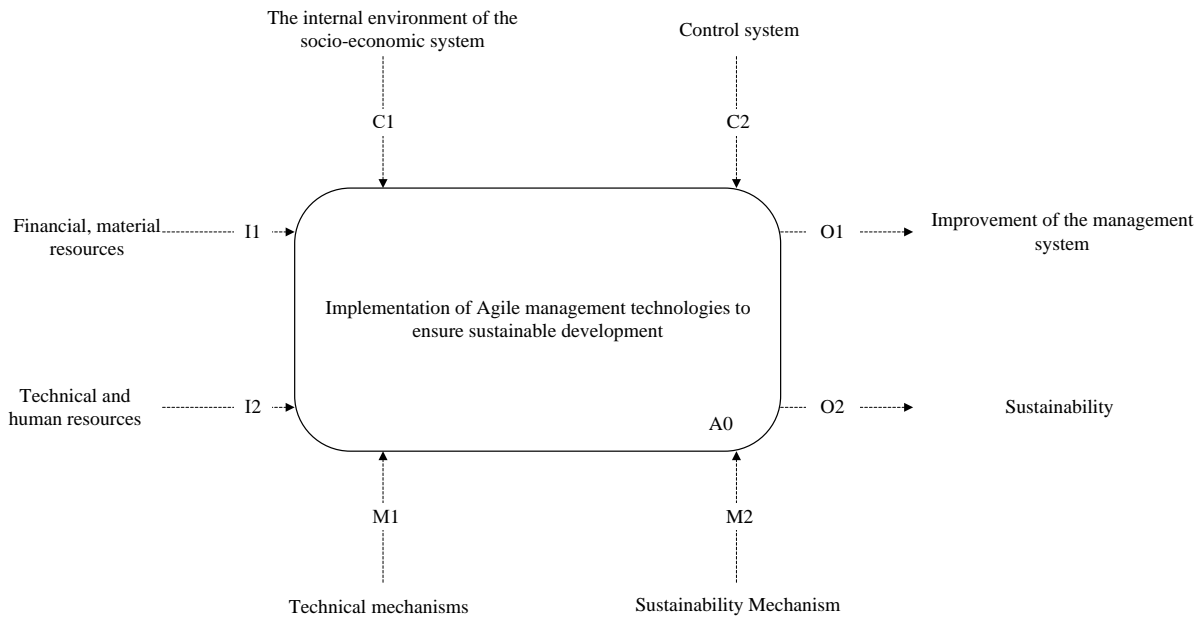
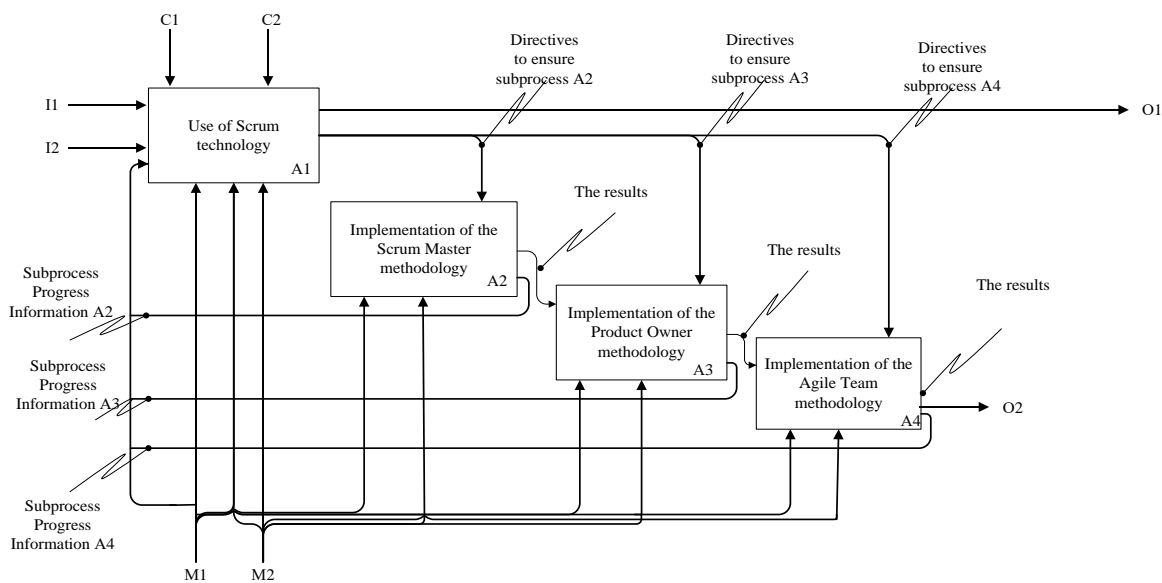


Figure 1. The A0-Implementation of Agile management technologies to ensure sustainable development achievement node tree



**Figure 2.** The context diagram to ensure the achievement of A0-Implementation of Agile management technologies to ensure sustainable development



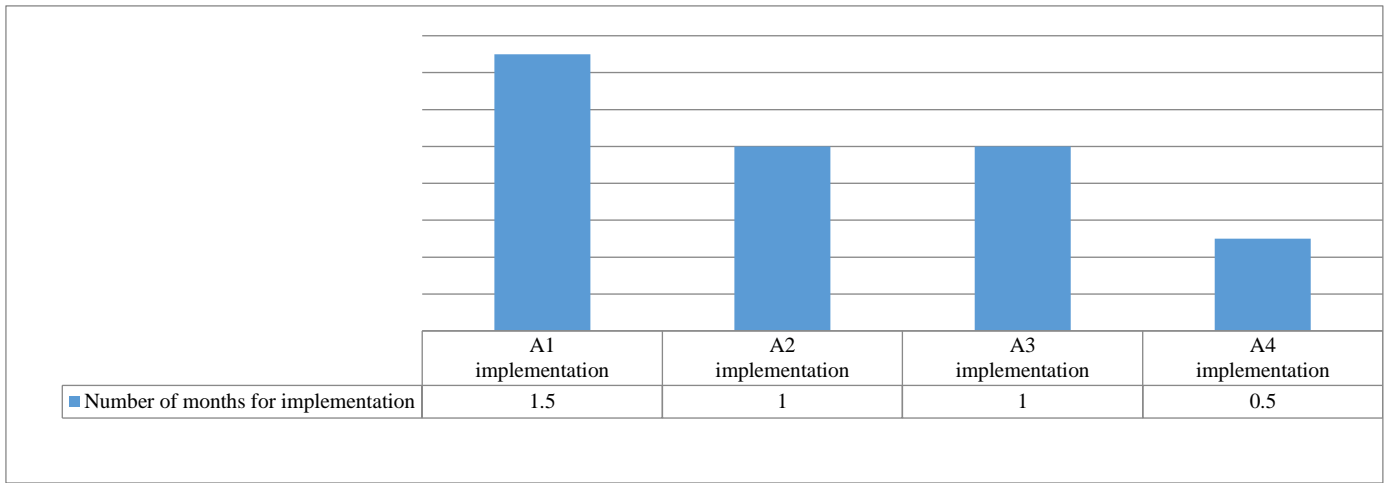
**Figure 3.** The main decomposition of A0-Implementation of Agile management technology to ensure sustainable development

A3. Implementation of the Product Owner methodology. The Product Owner is the person responsible for developing the product. As a rule, this is a product manager for product development, a project manager for internal development, and a customer representative for custom development. The Product Owner is the single point of final decision for the team on a project, so it's always one person, not a group. The responsibilities of the Product Owner are as follows: responsible for the formation of a specific type of product, coordinating the product, interacting with the team and the customer, and providing clear and testable requirements for the team. The Product Owner assigns a task to the team, but he does not have the right to assign a task to a specific member of the project team during the implementation of the final result.

A4. Implementation of the Agile Team methodology. In the

Scrum methodology, the team is in charge. The team is committed to delivering the scope of work. The work of the team is evaluated as the work of a single group. In Scrum, the contribution of individual members of the project team is not valued because it destroys the self-organization of the team. Team Responsibilities: Responsible for evaluating all elements of the product, making design decisions, accountable for the result to the Product Owner, and tracking their progress (together with the Scrum Master). The size of a team is limited by the size of a group of people who can communicate effectively with each other.

We proposed to use the model developed in the article in the practice of the activities of Shobeli LLC. It was interesting for us to find out in what time frame each stage from the presented model is implemented (Figure 4).



**Figure 4.** The periods of implementation of the stages of the A0 model in the practice of a particular socio-economic system

Thus, we understand that the process of ensuring sustainable development is a long one and it is impossible to talk about its success in a short time. However, the positive development of new technologies suggests that the socio-economic system we have chosen has all the rudiments for such development.

## 5. DISCUSSIONS

Discussing the results of the study, it should be noted that these are not the first results on this topic. Scientists [12-15] are actively looking for new ways to solve the problem of sustainable development through modern management technologies. For example, a different number of scientific papers are devoted to Agile management at the state level. In this aspect, it should be noted that the main attractive feature of Agile in the public administration sector is that this methodology sets certain priorities, determines the degree of importance and regulates the focus, but does not prohibit tools and processes, documentation and compliance with the terms of contracts (contracts), compliance with plans.

The rest of the scientists focus on changing the paradigm of adherence to the principles of Agile management [16-18]. Thus, the very fact of the transition to the latest management principles is a factor that optimizes the company's work in conditions of uncertainty. Changes in the principles of management, characteristic of the knowledge economy, associated with the need to solve unique problems, are being introduced into the management of enterprises, and will certainly be introduced into the management of industrial enterprises, although traditional management principles will be relevant for them for a long time and used in parallel with new ones.

There are cases when, in the process of discussing the results of a study, scientists also point out the shortcomings of Agile management. Despite the noted advantages, Agile also has some disadvantages: a large dependence of the project's success on the level of qualification, experience, professionalism of the team, its orientation and the quality of communications built with the customer; the risk of immutable product configurations and the endless addition of tasks to the project; limited information of project team members regarding the final characteristics of the product; the existence of abandoned, never updated and insufficiently exhaustive documentation; the inability of the company as a whole to

accept the basic values of Agile management, according to which the culture and structure of the organization should be revised; the impossibility of accurately determining the final cost and timing of the project [19, 20].

Discussing our results in the article, we can note that our results have a number of innovative elements. As a result, a tree of modeling goals, a context diagram, and a basic decomposition were presented. The innovativeness of the article is presented in the presentation of a new methodological approach to ensure innovation with the help of AGILE-management technologies in the context of the sustainable development of the socio-economic system.

However, our results have certain scientific and practical differences. First of all, it concerns the application of a new modeling methodology for a better understanding of the aspects of Agile management in the system of ensuring sustainable development. Another aspect that characterizes the distinctive features of our study is the concentration of scientific and practical attention on a single socio-economic system, which made it possible to choose an individual approach and take into account the specifics of sustainable development.

## 6. CONCLUSIONS

Summing up, it should be noted that in the modern communication world, most enterprises have begun to apply the project approach to their activities more often. Socio-economic systems have wide access to information, but the excess of this information leads to the fact that every day we are surrounded by all kinds of gadgets and communication is increasingly done through communication devices. And yet we move around in this communication space and contact with a large number of people, and at the same time we feel that we are not effective enough in managing our organizational processes. Management in Agile management is a new stage in which there will be no opacity of processes, ineffective management and an emotional outburst of low-quality communication indicators. Planning, process and project management in Agile allows professional specialists with a large set of specific skills to have part of the communication responsibilities of two or more roles at the same time. The Agile project manager is responsible for the overall strategy and coordination of projects. Agile complements its unified skills with traditional unique skills to make decisions and act

in the context of fast-paced, changing projects while communicating effectively in an agile development environment for sustainable development.

The main benefit of Agile management for sustainable development is flexibility, flexibility, flexibility again. Small steps and willingness to change allow you to quickly adapt to dynamic conditions.

We have proposed a functional technique for modeling the main stages of the implementation of Agile management elements to ensure the sustainable development of a single socio-economic system, which we have chosen as a good example.

The research methodology involves the use of a modern decomposition modeling method.

The study has a limitation by taking into account only AGILE-management technologies in the context of the sustainable development of the socio-economic system. Prospects for further research should be devoted to finding ways to ensure innovation through personnel management.

The study is limited. In service-oriented innovation projects, when you have a task and a goal, you can afford some more leeway. If the whole process is strictly regulated and clear goals are indicated, then Agile management is most likely not suitable. In addition, we have narrowed the focus of the study only on a specific socio-economic system. This should be expanded in the future.

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