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Methodological Approach to the Implementation of Planning in the Management System of Innovative and Production Activities of Enterprises for the Sustainable Economic Development of the Region

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ABSTRACT

The purpose of the study involves the presentation of a methodological approach to planning in the management system of innovative and production activities of enterprises for the sustainable economic development of the region. To achieve the goals set, a number of methods were used that formed the research methodology. The main practical method that was used is the method of functional modeling and graphical demonstration of the process. The method is a modeling technique with specific goals and sub-processes to achieve it (IDEF). The results of the study demonstrated the formation of decompositions of models, each of which offers certain areas for improving planning in the management system of innovative and production activities of enterprises for the sustainable economic development of the region. The model was presented in the practice of several enterprises in a particular region. The model has all the principles of effective application for the implementation of the planning function in the management system of innovative and production activities of enterprises for the sustainable economic development of the region. Originality is manifested in the application of existing methods in a new field.

1. INTRODUCTION

The innovation model should become dominant for most regions of the world. The development of enterprises is the basis for sustainable economic development and raising the socio-economic standard of living of society in the region, however, such development takes place without due regard for the exhaustibility of many types of resources and an understanding of the fact that the regenerative abilities of wildlife are not unlimited. Globalization, crisis phenomena and growing competition in the world market lead to the need to find new ways to improve production efficiency. World experience shows that enterprises become the driving force for the introduction of innovative and production solutions, and the development of cooperation processes and the growth of the share of small enterprises in the total output of large enterprises contribute to the sustainable development of the region.

Planning is a key function of managing innovation and production activities in the context of sustainable development. Innovative and production activities of the enterprise are activities aimed at finding and implementing innovations in order to expand the range and improve product quality, improve technology and production organization. The innovative activity of the company must include: identifying the problems of the company; implementation of the innovation process; innovation company.

Most scientists are aware [1-3] that the ability to innovate is a powerful factor in competitiveness and sustainable development, which is sorely lacking in enterprises and regions as a whole. It is also necessary to be aware that the costs allocated to the development of new products and processes are investments in the future of the enterprise. Thus, in a modern market economy, it is innovation and production activity that is the determining factor that provides conditions for sustainable and long-term economic development.

The structure of the article implies an analysis of modern literature, an explanation of the research methodology, a presentation of the main results and their discussion.

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2. LITERATURE REVIEW

Reviewing the literature, it should be noted that it is not news to say that today the sustainable economic development of the region depends on many factors and factors. In particular, such socio-economic systems as enterprises play an important role. According to most scientists [4-6], it is the effective innovation and production activities of enterprises that can contribute to the sustainable development of the whole region, where socio-economic systems function and conduct their economic activities.

Most scientists and practitioners [7-9] note that in the 21st century it is impossible to talk about sustainable development without innovation. It is they who form the competitiveness of the region and can form the basis for further planning of sustainable economic development. All this confirms the fact of the importance and relevance of managing the innovative and production activities of an enterprise in the system of sustainable development.

Based on the analysis of a significant amount of literature [10, 11], we came to the conclusion that planning the management of innovation and production activities should be considered as a systematic and structured process aimed at turning all innovative and production ideas into a real socio-economic effect in the enterprise and sustainable development of the region in its functioning.

In general, there are scientific opinions that the mechanism for managing the innovation and production activities of the socio-economic system itself should be aimed at fulfilling the tasks set through the use of certain means and methods for this [12-14].

As Urba et al. [15] notes, it is human resources that have the most significant impact on the achievement of innovative and production goals for any socio-economic system. Human resources in enterprises play a key role in sustainable development and can make a high contribution to innovation in general.

A separate problem was planning to counteract the negative impact of a different number of factors and factors on the management system of innovation and production activities. For example, as noted by a certain group of authors [16-18], the key negative factors that can harm the innovation and production activities of any enterprise are inefficient planning in the management system of the socio-economic system. Without clear processes and stages, it is impossible to achieve the effectiveness of innovation management.

Innovation and production activity in the system of sustainable development is considered around the globe. Each region strives for sustainable economic development. As noted by Adekola, Korsakienė, Tvaronavičienė [19], important aspects of sustainable development of the region are manifested precisely through innovation. In general, the regions of the European Union often become the objects of research on the issues of sustainable economic development [20, 21]. As a model of international experience, other regions of Europe should be considered as a good example of effective sustainable development, or vice versa.

There is no doubt that innovation and production activities become the basis for a high level of competitiveness of both an individual enterprise and the region as a whole. Xuyen et al. [22] in the study identified the basic elements as to maintain a high level of innovation and production activity at enterprises in the conditions of modern sustainable development.

Despite the great scientific and practical attention to the issue, our study remains relevant due to the fact that information support for planning the management of innovative and production activities of enterprises in the region in the context of sustainable development is practically not considered. The results of our study provide a new approach to the formation of a model in this area of research.

3. METHODOLOGY

Conventionally, the research methodology can be divided into theoretical methods that involve the analysis and generalization of the information received from various scientific sources, which is better to understand the subject matter of the research problem. And practical methods, which include the technique of process modeling and graphic representation (IDEF0). Widely used in mathematics and economics. This modeling technique allows you to well structure a particular process for any socio-economic systems.

It should be noted that all methods used in the study are aimed at promoting efficient modeling and presentation of the best graphical results.

Firstly, it is necessary to form the basic elements of the model for the implementation of the adopted management decisions on the innovative and production activities of the enterprise as a socio-economic system for the sustainable development of the region where it operates (Table 1).

Table 1. The basic elements of the model

Elements	Element entity for our model
Target direction	Form an effective graphical model of the functional area
The audience	Key employees and management of innovation and production activities
Model context	Functional elements and objects
Software	Vector diagram programs

Separately, I would like to note the interview method, but its application can be described as partial, since it was used for top management of individual enterprises. Planning, whatever it may be, is always a set of stages and sub-processes that should turn certain resources and information into a socio-economic effect. So, let's set ourselves the main goal - Ensure effective innovation and production activities of the enterprise (A0). Thus, A0 is the high level of our model, and in order to achieve it, it is necessary to execute A1, A2, A3, A4. It is better to demonstrate the presented material in a graphical form (Figure 1).

Using the "Decision tree" method, we tried through this method to better clarify the process of modeling itself. This method is solely an addition to the main methodology.

Also, a similar role is played by the "Black Box" method, showing all the additional elements to achieve the goals (Figure 2).

To better clarify all aspects of Figure 2, we first note that the symbol I1 represents the inputs and information needed to achieve the stated goal. In turn, respectively, O1-O2 is the initial information that can be obtained upon successful achievement of the goal. C1-C2 and M1-M2 are nothing more than auxiliary elements to achieve the set goals, which may vary depending on the external environment.

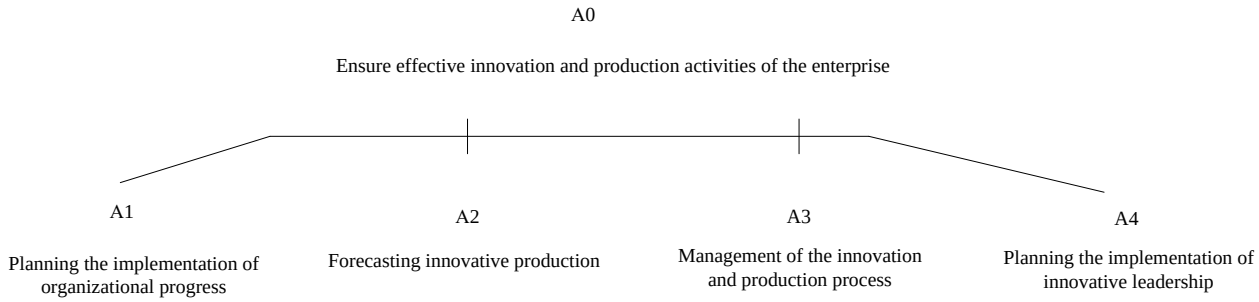

Figure 1. The main hierarchy of achieving A0

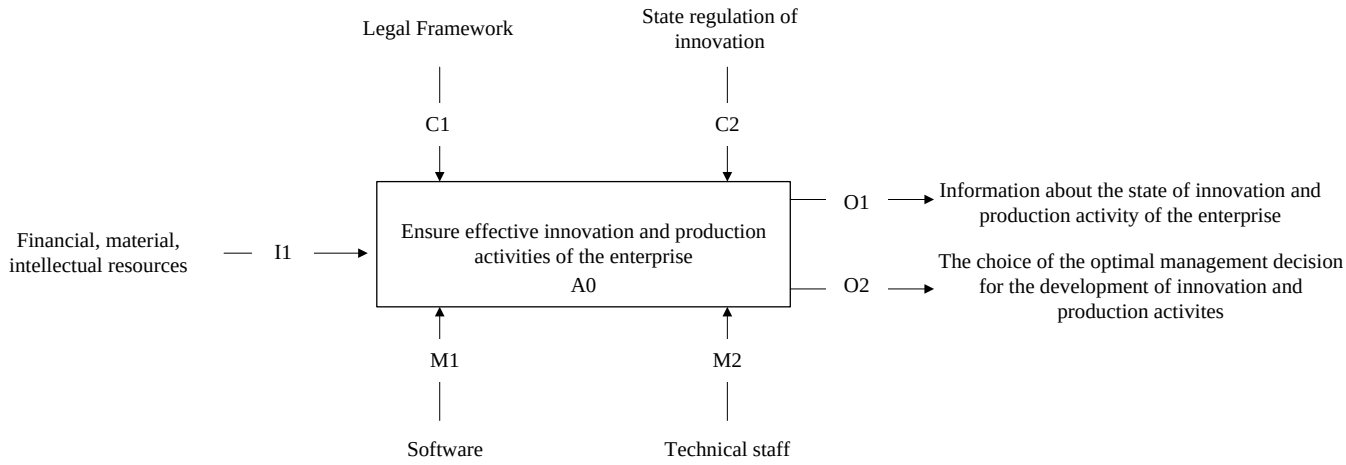

Figure 2. Depicting key elements to achieve key modeling objective

4. RESULTS OF RESEARCH

The main decomposition of the model with a graphical representation of the planning of the management of the innovative and production activities of an enterprise in the context of sustainable economic development is shown in Figure 3.

Thus, in the presented decomposition, we have resource input arrows and what we want as output (arrows O1-O2). M1 and M2 are auxiliary mechanisms that affect each process and their arrows point to each block. C1 and C2 perform a kind of control and regulation function, guiding each process from the first. Also, each process has its own progress and directives.

Subprocess progress information is information about how a particular process or step is performed. Based on the information received, management actions can be taken to correct the entire decomposition.

Directives for providing a subprocess are certain directions and regulatory tools that determine the course of a particular process in the decomposition.

So, let's clarify each element of our model in detail:

A1 – Planning the implementation of organizational progress. To increase production and manage production activities, you should actively plan your development. Every socio-economic system must constantly pay attention to the following things (Figure 4).

Therefore, to achieve A1 it is necessary:

A11 - Planning for strengthening the forms of organization of production. The planning process should be aimed at the demonopolization of the production of the main types of products, the competition of manufacturers in the market, and multiplier efficiency.

A12 - Planning for strengthening business continuity. Planning should provide for the expansion of the process of automation of production.

A13 - Rationalization of the use of means of production. Improving logistics and conducting efficient organizational operations.

A2 - Forecasting innovative production. It is extremely important to constantly plan and predict socio-economic systems in the management of innovation and production activities. This improves the efficiency of managerial decisions (Figure 5).

Therefore, to achieve A2 it is necessary:

A21 - Strategic planning and forecasting of innovations. Strategic planning and forecasting should be targeted and be able to achieve certain forecasts.

A22 - Tactical planning and forecasting innovations. Tactical planning and forecasting of innovation and production activities should include the process of creating prerequisites for the implementation of the strategy through tactical actions.

A23 - Operational planning and forecasting of innovations in the enterprise. Operational planning on the ground for early forecasts.

A3 – Management of the innovation and production process. The management of innovative and production processes is an inseparable part of the production and economic activities of enterprises, which is a kind of impetus for development, using

new approaches in solving permanent production problems. An effective, thorough and optimal combination of production and innovation activities opens up many opportunities not only for continuous improvement of the production process and products, but also for identifying new promising areas and forms of business and diversifying activities to meet the new needs of society (Figure 6).

Thus, to achieve A3 it is necessary:

A31 - Management of innovation and production projects. Active innovation and production activity of the enterprise is one of the most important factors for ensuring competitiveness and continuous sustainable development. In modern conditions, the classical mechanism of economic activity is often not enough to create an effective system for managing innovation and production projects. Increasingly, enterprises need to restructure their organizational and production structures, change the management style, and management functions.

A32 - Management of innovative products. These new or updated products become innovations that improve the state of the socio-economic system. This process requires significant efficiency in the planning process itself.

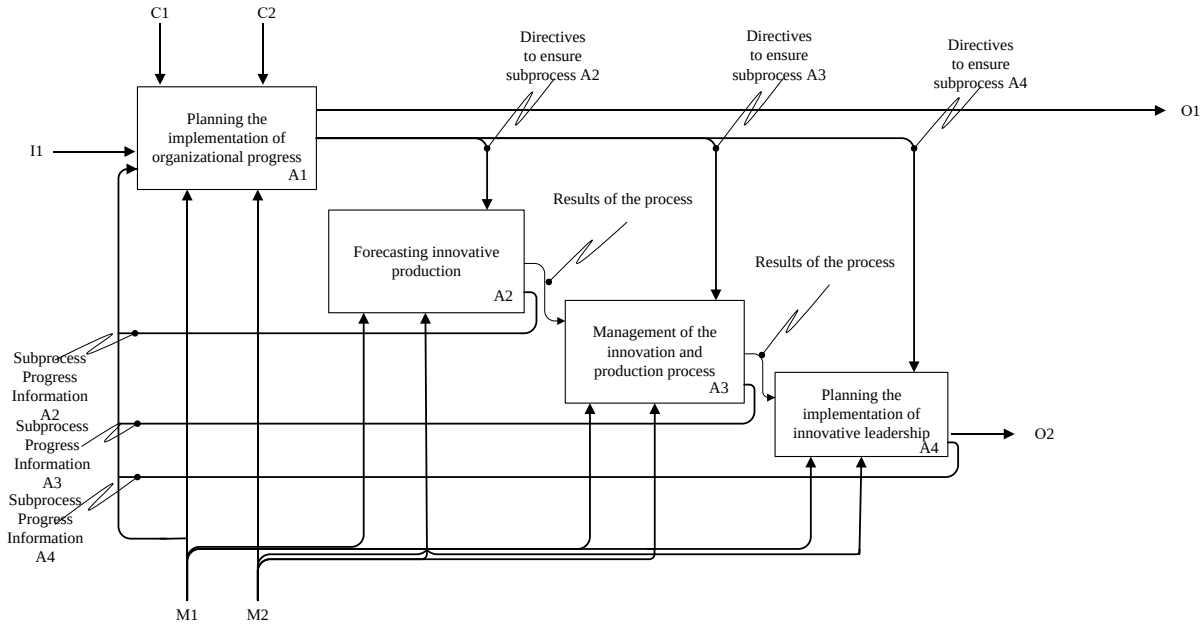

Figure 3. The decomposition of the model for achieving the process A0

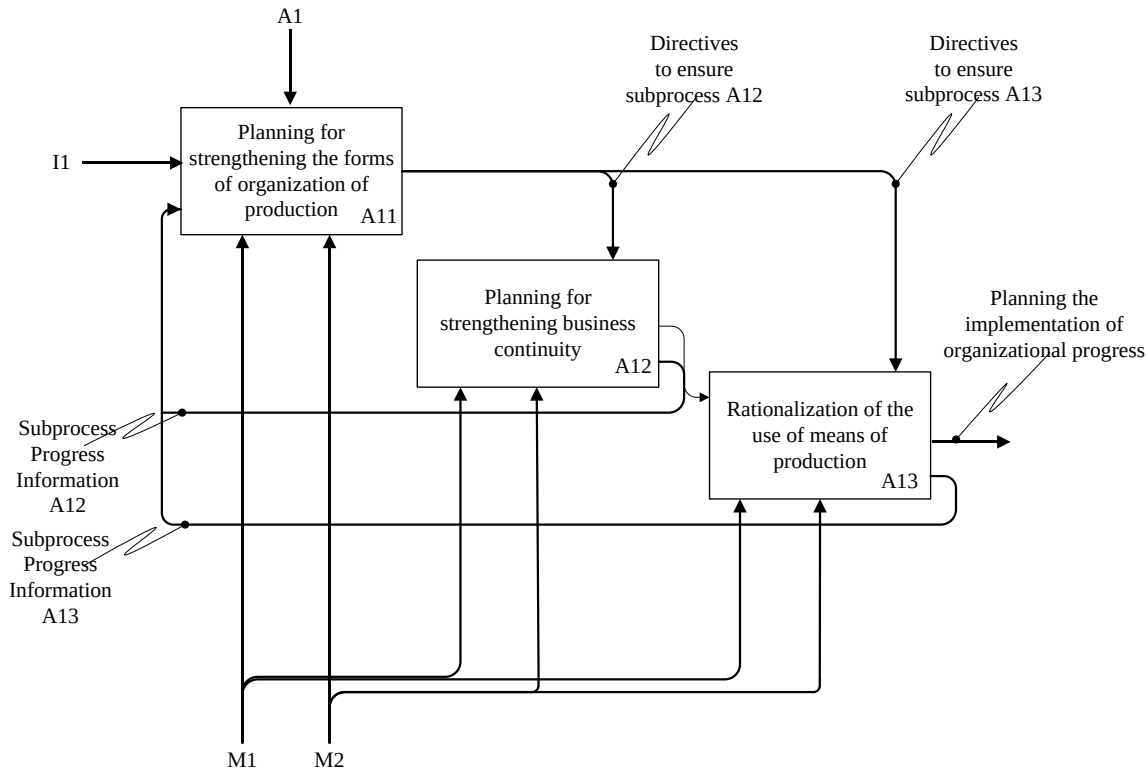

Figure 4. The decomposition of the model for achieving the process A1

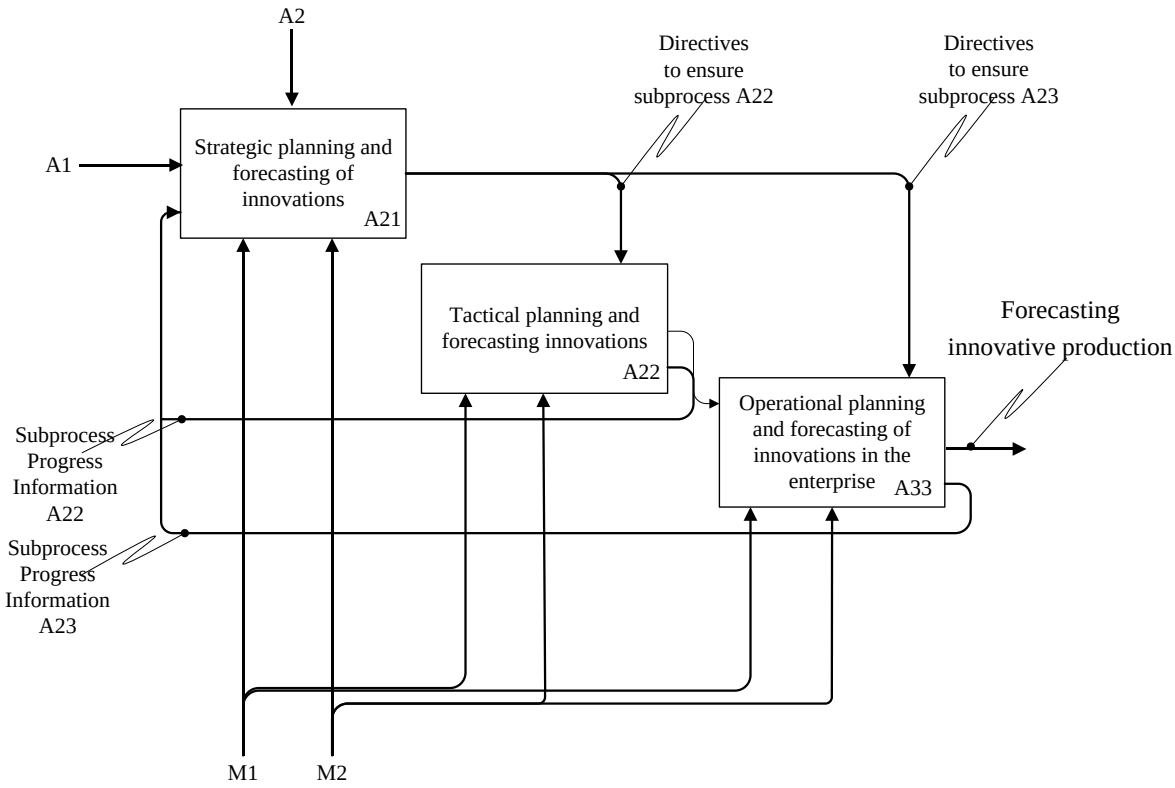

Figure 5. The decomposition of the model for achieving the process A2

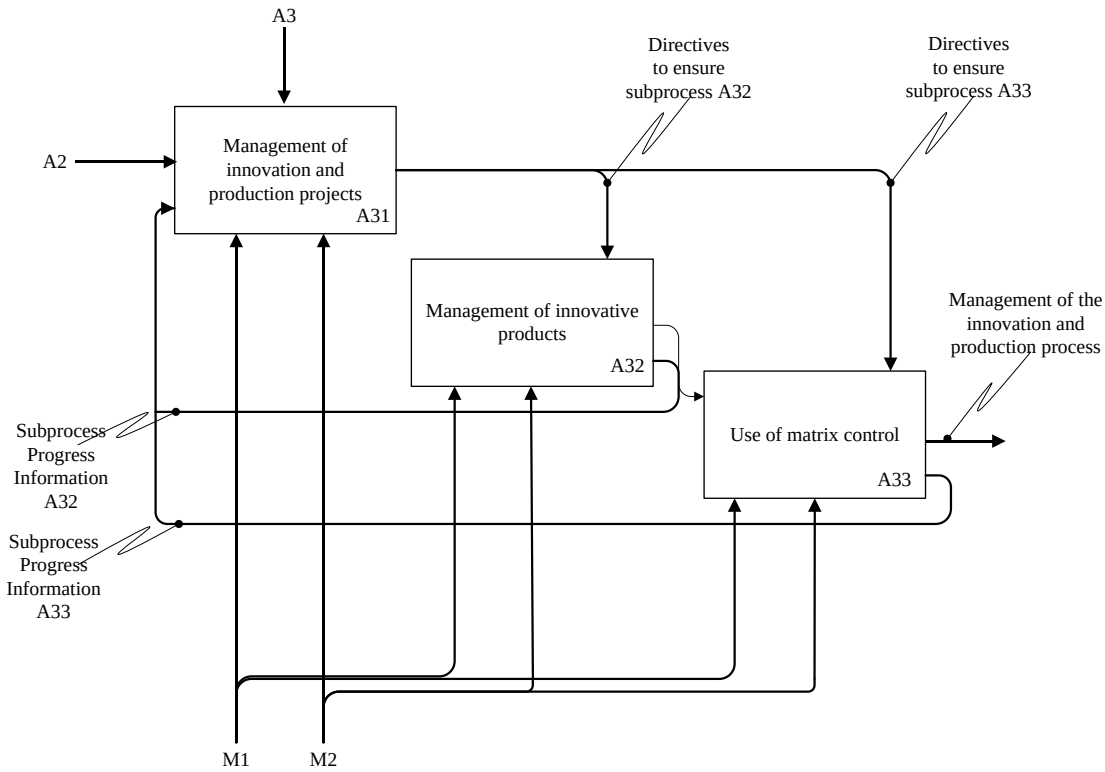

Figure 6. The decomposition of the model for achieving the process A3

A33 - Use of matrix control. Through matrix management, teams of specialists should be effectively formed and oriented towards innovation and production activities.

A4 – Planning the implementation of innovative leadership. Since the modern information society radically differs from the previous industrial one in its attitude to innovative processes, the formation of an innovative environment becomes the basis for its development. Innovation leadership is an approach that combines different leadership styles in order to influence subordinates and help them develop creative ideas, products and services. It is a practice and approach to organizational development and organizational change. The decomposition of the execution model of stage A4 is shown in Figure 7.

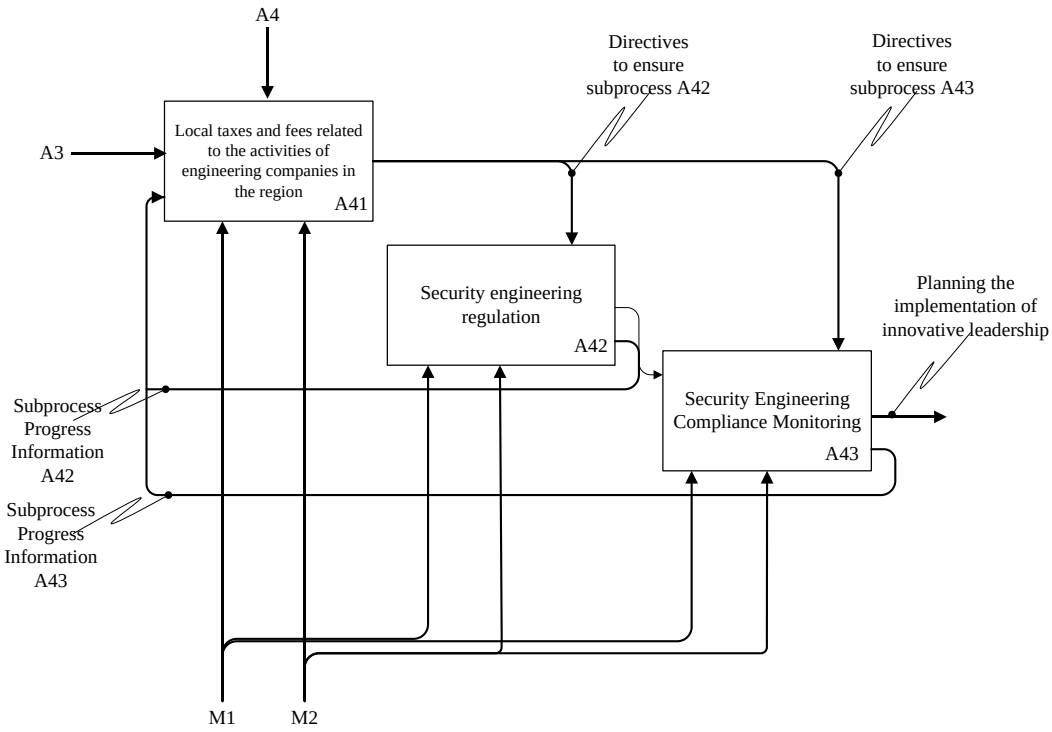

Figure 7. The decomposition of the model for achieving the process A4

Therefore, to achieve A4 it is necessary:

A41 - Development and planning of a strategy for the formation of investment and production resources. It is necessary to correctly plan the strategy for the formation and use of investment and production resources. Indicate the amount of investment required and determine how this investment will take place.

A42 - Formation of an innovative portfolio. It is necessary to correctly calculate the key investment and innovative characteristics of the socio-economic system.

A43 - Monitoring the implementation of innovative programs. Planning should be based on the results of the control and monitoring carried out. Information must be periodically collected and analyzed.

Thus, the proposed models are more theoretical. At this stage, the main thing was to show how, in general, this methodology can work in the field of planning the management of innovative and production activities of an enterprise in a sustainable development system.

5. DISCUSSIONS

Discussing the results of our study, this section should be divided into two parts. Speaking about the results of our study, it is advisable to divide this section into two parts. It should be discussed how our research results differ from others. In fact, it is the presence of the methodology described above that is not new. For example, scientists [23-25] used a similar methodology to ensure one or another security of an enterprise for its economic development or even the most sustainable development of the region [26-28]. Our research findings focus on the type of management where this methodology is relevant and new.

Discussing the specifics of the innovative and production activities of an enterprise in the system of sustainable development, it should be noted that most scientists [29-31] are actively forming models of a favorable innovative environment for certain socio-economic systems. However, our research results have a number of differences through modeling, which reflects precisely the management system and its planning function very effectively.

A basic survey was conducted, which was not in the nature of a professional expert study. The survey was conducted purely to determine the opinion of several top managers of individual enterprises in the region regarding the effectiveness of the model proposed based on the results of the study. The enterprises presented in Table 2 have a certain impact on sustainable economic development in their region.

Table 2. Results of a voluntary survey of top managers on innovation and production development of individual enterprises in the Lviv region

Company	Is the proposed model easy to use?	Was the content clear?	Are you ready to use the model in the future?
PJSC " Lviv Conveyor Enterprise"	Yes	Yes	Yes
PJSC "Lviv Engineering Plant"	Yes	Yes	Yes
PJSC " Lviv-Electron"	Yes	Yes	Yes
PJSC "Lviv Electrotechnical Enterprise"	Yes	No	No

Most top managers of selected enterprises claim that the models are sufficiently convenient and efficient. Of course, this is not an exact and high figure, but a good start for further extended research. For example, such studies can be modeling the control system for the management of innovation and production activities. In general, the results of the study can be

considered more theoretical, but with elements of practical foundations.

6. CONCLUSIONS

We came to the conclusion that innovation and production activities have a great impact on the quality of life, people's attitudes, their attitude to the environment and the sustainable development of the region. Given the current aggravation of global problems, it can certainly be argued that the further progress of mankind is possible only with effective planning, innovation and production.

Summing up, it should be noted that the main results of our study are the application of the methodology, the formation of structured compositions of the model for planning the management system for innovative and production activities of enterprises in the context of sustainable development. We have characterized each stage and process for a better understanding of the models. An attempt was made to present a practical model for a specific group of enterprises that have a significant impact on the sustainable development of the region where they operate.

The study is limited by the selection of a particular region. Validation of the effectiveness of the presented models was only for one region. Due to a number of restrictions, we were forced to apply our methodology only to enterprises in the Lviv region.

Of the recommendations, the importance of forming full-fledged departments of innovation and production development at enterprises should be highlighted. This will significantly increase the efficiency of planning in the management system.

If we talk about further research, it should be noted that planning alone in the management system is not enough. You should pay attention to other functions. For example, it is extremely relevant in future research to pay attention to the control over the innovative activity of an enterprise and how this control should intersect with the goals of sustainable development.

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