

**SCHEDULING AND SELECTING THE METHODS OF INNOVATION PRODUCTS'  
PROMOTION TO THE MARKET**

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**Abstract**

*Nowadays in Ukraine's economy, one of the most important targets in innovation products' promotion to the market is scheduling and selecting the promotion methods. The paper reviews problems in innovation products' promotion to the market and proposes different simulation techniques and tools for scenario analysis. Through the use of Business Process Modeling Notation (BPMN), the article focuses the attention on reconciliation of interests of innovation products' producers and agents of transfer. Besides that it expresses the view that project-based approach can be used for improving the innovation products' promotion. The paper also deals with a simulation model of the innovation products' diffusion developed in terms of system dynamics. This model allows estimating the effectiveness of the commercialization of innovation products depending on the implementation of internal management decisions and the impact of external factors.*

*Keywords: Innovation Products, Promotion, Real and Potential Customers, Subjects of Promotion.*

**INTRODUCTION**

The studies of Bass (1969), Charters (1972), Cooper (1990), Davies (2002), Dean J. (1976), Gibson (1990), Joachimsthaler (2009), Keller (2011), Kotler (2002), Lovelock (2004), Mahajan (1990), Nutley (2002), Pellegrin (1972), Petrosyan (2008), Popov (2002), Rogers (1995), Williams (1990), Walter (2002), Wolfe (1994), Zmud (1990) are devoted to research of methods of promotion the innovation products to the final consumer.

However, in the above studies the mechanism of scheduling of innovation products' promotion to the market is not clearly described. So, it's important to find out criteria of methods' selection by which innovation products in the shortest possible time with minimum cost for its producers can be advanced on the market.

Thus, this study is devoted to development of organizational arrangements of scheduling and selecting the methods of innovation products' promotion to the market.

Therefore, study's objectives are to define subjects of promotion and clarify their relationships and subordination, select methods and time limits of promotion. As a result of these activities will be possible the harmonization of subjects' interests by developing and promoting innovation products, whose interests often do not coincide.

## **METHODOLOGY**

The divergence of interests of innovation products' producers and agents of transfer is a cause of gap between the process of promotion of innovation products to market and innovation process. Currently, there are scores of process modeling tools and methodologies. Business Process Modeling Notation (BPMN) will provide participants of innovation products' promotion to the market the capability of understanding their internal business procedures in a graphical notation and will give them the ability to communicate by using these procedures in a standard manner. Therefore, a standard graphical notation will facilitate the understanding of the performance collaborations and business transactions within and between the organizations. This will ensure that participants of innovation products' promotion to the market will understand themselves and participants in their business and will enable them to adjust to new circumstances quickly.

Untimely decisions in management of innovation products' promotion to the market will lead to groundless of beginning and end of such promotion. The project-based approach can improve the innovation products' promotion to the market. This approach allows organizing the innovation process as a series of projects by the innovative products' generation, promotion to the market and diffusion there. In general, the beginning of a new project may precede the time of completion of the old project, match or follow him.

Lack of monitoring system for scale and speed of innovation products' promotion to the market doesn't allow reacting quickly to deviations from the planned parameters using formal and informal methods. This paper elaborated the simulation model of innovation products' diffusion formalized in terms of system dynamics. This model is based on the conceptual model of the diffusion of innovations (Rogers, 1995). Furthermore it develops a mathematical Bass' model of the diffusion of innovation (Bass, 1969). This model allows estimating the range and speed of innovation products' diffusion.

## **RESULTS**

First of all, it should be identified the subjects of promoting the innovative products to the market:

- Producers of innovation products;
- Consumers of innovation products;

- Business entities, intellectual property or rights on that property used in the production of innovation products;
- Financial and credit institutions and foreign organizations which direct their funds to finance the process of promoting innovation products to the market;
- Intermediaries involved in the process of promoting innovation products to the market;
- Organizations that provide services of financial leasing, engineering, consulting, sales and marketing, information security, certification, standardization so on; and research and technology parks, business incubators and other organizational structures to facilitate the promotion of innovation products to the market;
- Public authorities which regulate the process of promotion of innovation products to the market.

The deficit of own financial assets, high price on loans, and duration reduction of innovation products' life cycle determine the searching for partners and investors in the process of promoting innovative products to the market(Figure 1).

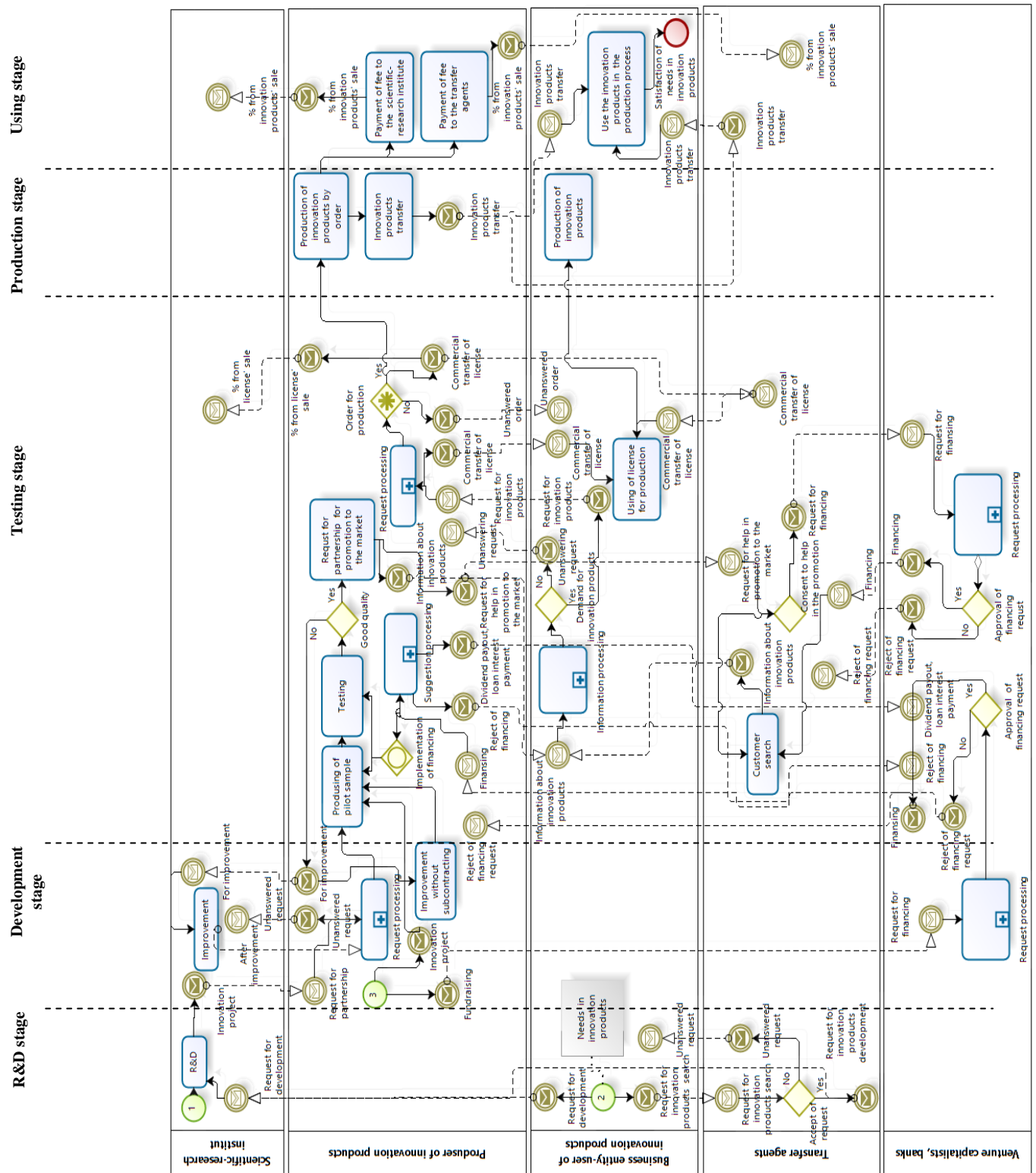
Promotion of innovation products to the market may be performed by a vertical or horizontal integration of subjects (Colangelo, 1995). Cooperation between subjects possible within:

- Sectorial research institute, created by business entities on the basis of mutual funds;
- Innovation centers on the basis of combining entities, representatives of science and industry;
- Financial-industrial groups (FIGs) holdings and others with horizontal (sectorial), vertical (cross-sectorial), mixed (horizontal plus vertical) and diversified (through the merger-takeover) relationships between business entities.

After defining the subjects of promotion and dividing the rights and obligations between them it is necessary implement market testing of innovation products (Kravchenko, 2006).

The next step in scheduling of innovation products' promotion to the market should be study of reaction of the major consumer' groups. Their reaction depends on their expectations and reputations of producers. Then producers of innovation products choose a pricing strategy (Dean, 1976).

Figure 1: Scheme of searching for partners and investors in the process of promoting innovative products to the market in BPMN notation



Defining a strategy and pricing methods, go to the next step of in scheduling of innovation products' promotion to the market – to the choose of promotion methods. Traditional methods of



Figure 3: Diagram of the model of innovation products' diffusion in the application program

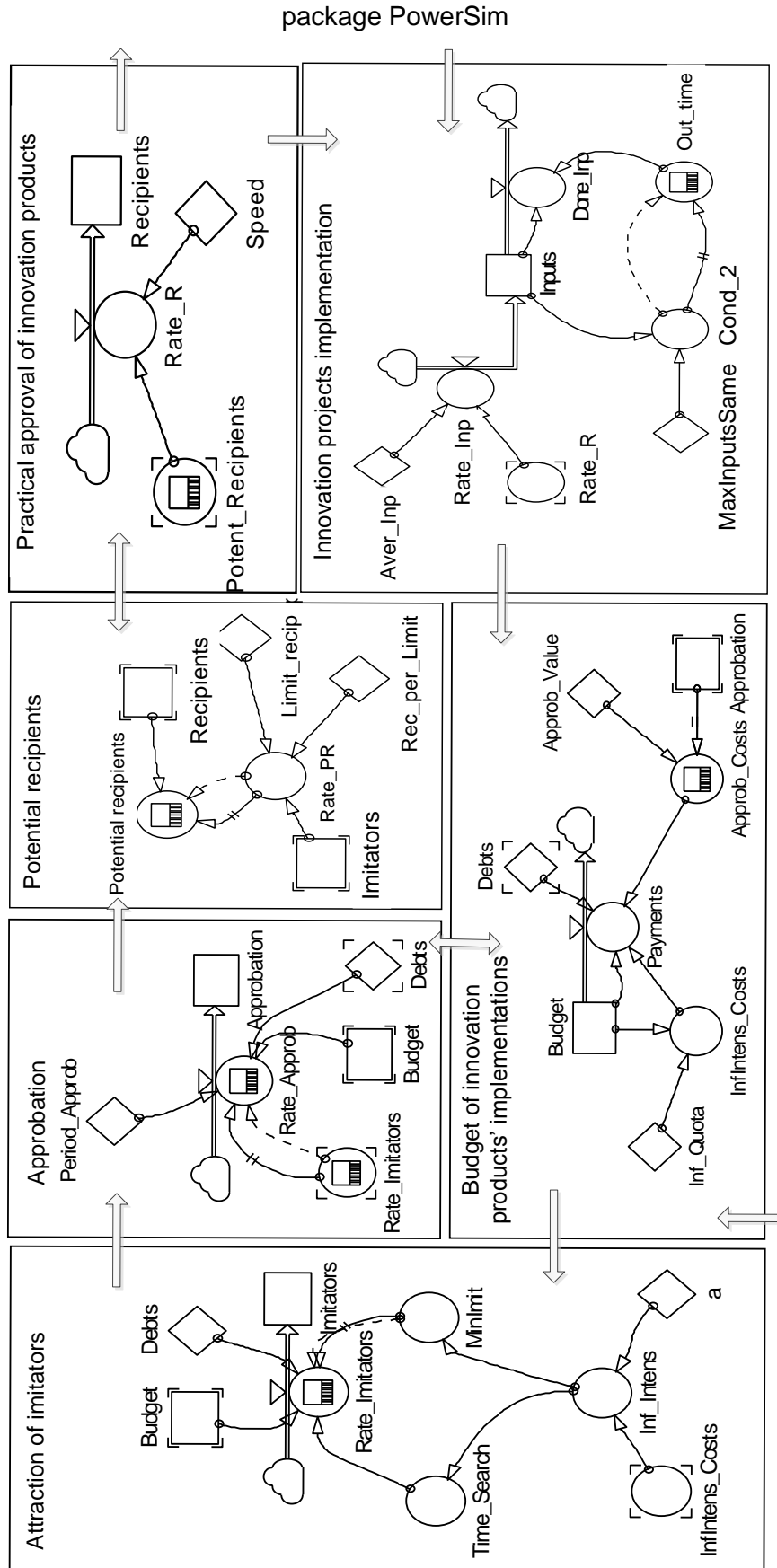


Figure 3 represents the diagram of the model of innovation products' diffusion, built in the application program package PowerSim. The diagram of the model is represented in symbols of system dynamics.

System dynamics software PowerSim' descriptions are as follows:

An initialization link (init) – provides start-up (initial) information to variables (both auxiliaries and levels) about the value of other variables. In other words, the initial value of a level or constant auxiliary;

A flow – represents the movement of commodities in and out of stocks, it can be considered to be a 'pipe'. In other words, a flow is the rate of changes of a stock;

An auxiliary (aux) – is used to combine or reformulate information. It is an algebraic computation of any combination of levels, flow rates or other auxiliaries

A constant (const) – is defined by an initial value and maintains this value throughout the simulation, unless user changes the value manually. In other words, a constant value allows for data input.

First of all, it is necessary to specify the name of the variable model and after "equal" - the equation of its calculation.

The total number of completed approbation:

flow  $\text{Approbation} = + dt * \text{Rate\_Approb.}$

The budget allocated for testing and correcting defects and errors in innovation products:

flow  $\text{Budget} = - dt * \text{Payments.}$

The total number of imitators throughout the life cycle of innovation products:

flow  $\text{Imitators} = + dt * \text{Rate\_Imitators.}$

The number of outstanding implementations:

flow  $\text{Inputs} = - dt * \text{Done\_Inp} + dt * \text{Rate\_Inp.}$

The number of consumers who have purchased innovative products:

flow  $\text{Recipients} = + dt * \text{Rate\_R.}$

The number of completed projects of implementation the innovation products:

aux  $\text{Done\_Inp} = \text{IF}(\text{ABS}(\text{Inputs}) > \text{Out\_Time}, \text{Out\_Time}, \text{ABS}(\text{Inputs})).$

The expenditure on testing the innovation products:

aux  $\text{Payments} = \text{IF}(\text{Budget} \leq \text{Debts}, 0, 1) * \text{Approb\_Costs} + \text{InfIntens\_Costs.}$

The rate of increase of approbations the innovation products:

aux  $\text{Rate\_Approb} = \text{DELAYMTR}(\text{Rate\_Imitators}, \text{Period\_Approb}, 3) * \text{IF}(\text{Budget} \leq \text{Debts}, 0, 1).$

The time of attracting the imitators to testing the innovation products:

aux  $\text{Rate\_Imitators} = \text{DELAYINF}(\text{MinImit}, \text{Time\_Search}, 3) * \text{IF}(\text{Budget} \leq \text{Debts}, 0, 1).$

The rate of increase the implementations of innovation products:



aux  $Rate\_Inp = Rate\_R * Aver\_Inp.$

The pace of the transition from a group of potential consumers of innovation products to the group of real consumers:

aux  $Rate\_R = Speed * Potent\_Recipients.$

The cost for approbation the innovation products:

aux  $Approb\_Costs = (Approbation - DELAYPPL(Approbation, 1, 0)) * Approb\_Value.$

The company-producer of innovation products cannot synchronously realize more than the maximum possible number of innovative projects:

aux  $Cond\_2 = IF(ABS(Inputs) > MaxInputsSame, MaxInputsSame, MAX(0, ABS(Inputs))).$

The intensity of informing consumers of innovation products:

aux  $InfIntens\_Costs = Budget * Inf\_Quota.$

Costs for increasing the intensity of informing consumers about the innovation products:

aux  $Inf\_Intens = IF(InfIntens\_Costs <= 0, 0, 1/EXP(a/InfIntens\_Costs)).$

The number of transactions with imitators of innovation products with involving the additional effort to their search:

aux  $MinImit = 1 * Inf\_Intens.$

The time for the completing the innovation project:

aux  $Out\_Time = DELAYPPLMTR(Cond\_2, 12, 18).$

The number of potential customers which know about innovation products and are interested in buying it (equation displays exponential delay in searching the potential customers):

aux  $Potent\_Recipients = DELAYINF(Rate\_PR, 4, 2) - Recipients.$

The growth rate of potential recipients' number of innovation products, depending on the capacity of the communication channel:

aux  $Rate\_PR = MIN(Imitators * Rec\_per\_Imit, Limit\_Recip).$

The time for attracting producer as an «imitator»:

aux  $Time\_Search = 12 - 4.5 * Inf\_Intens.$

The model parameters:

Approb\_Value – the cost of one testing;

Aver\_Inp – the average number of implementations of innovation products by one company;

Debts – the maximum level of budget gap;

Inf\_Quota – the share of costs for increasing the intensity of informing consumers about the innovation products;

Limit\_Recip – the maximum number of consumers that have demonstrated the demand for innovation products;

MaxInputsSame – the maximum number of simultaneous implementations of innovation products;



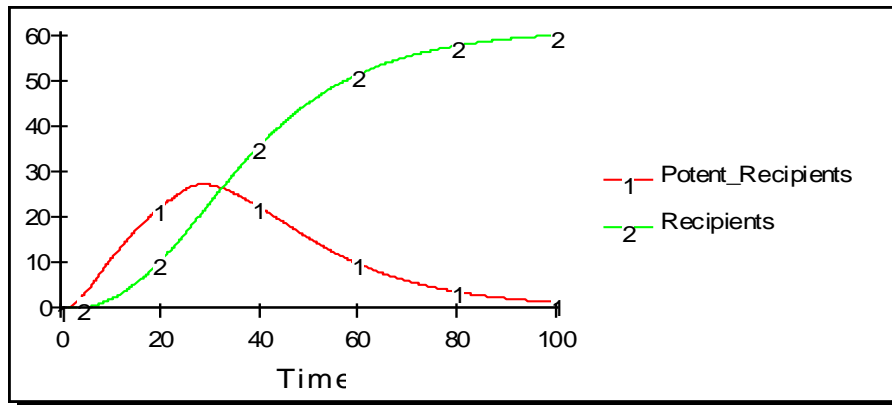
Period\_Approb – the period of time for testing the innovation products on the market;

Rec\_per\_Imit – the average number of «potential recipients» that are informed from one imitator in a certain period of time;

Speed – share of entities which are willing currently to begin the implementing of innovation products;

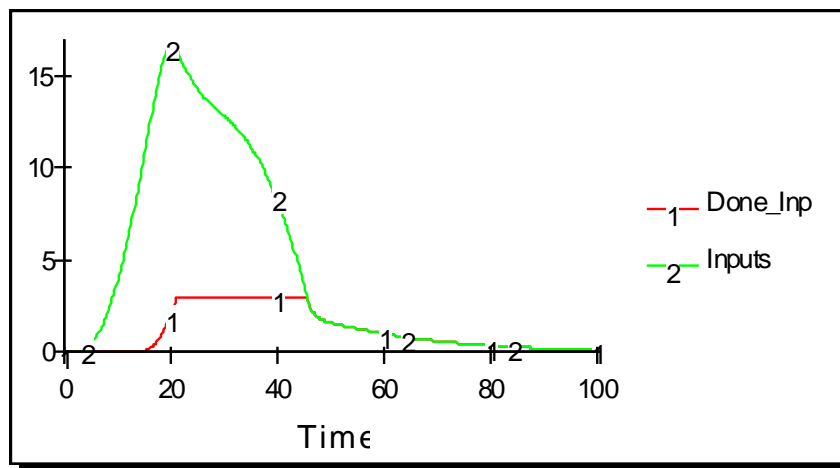
Results of the model of diffusion the innovation products are represented in Figure 4.

Figure 4: Dynamics of the number of potential and real consumers of innovation products



Dynamics of number of companies' orders for implementation the innovation products and the number of completed orders are represented in Figure 5.

Figure 5: Dynamics of number of companies' orders for implementation the innovation products and the number of completed orders



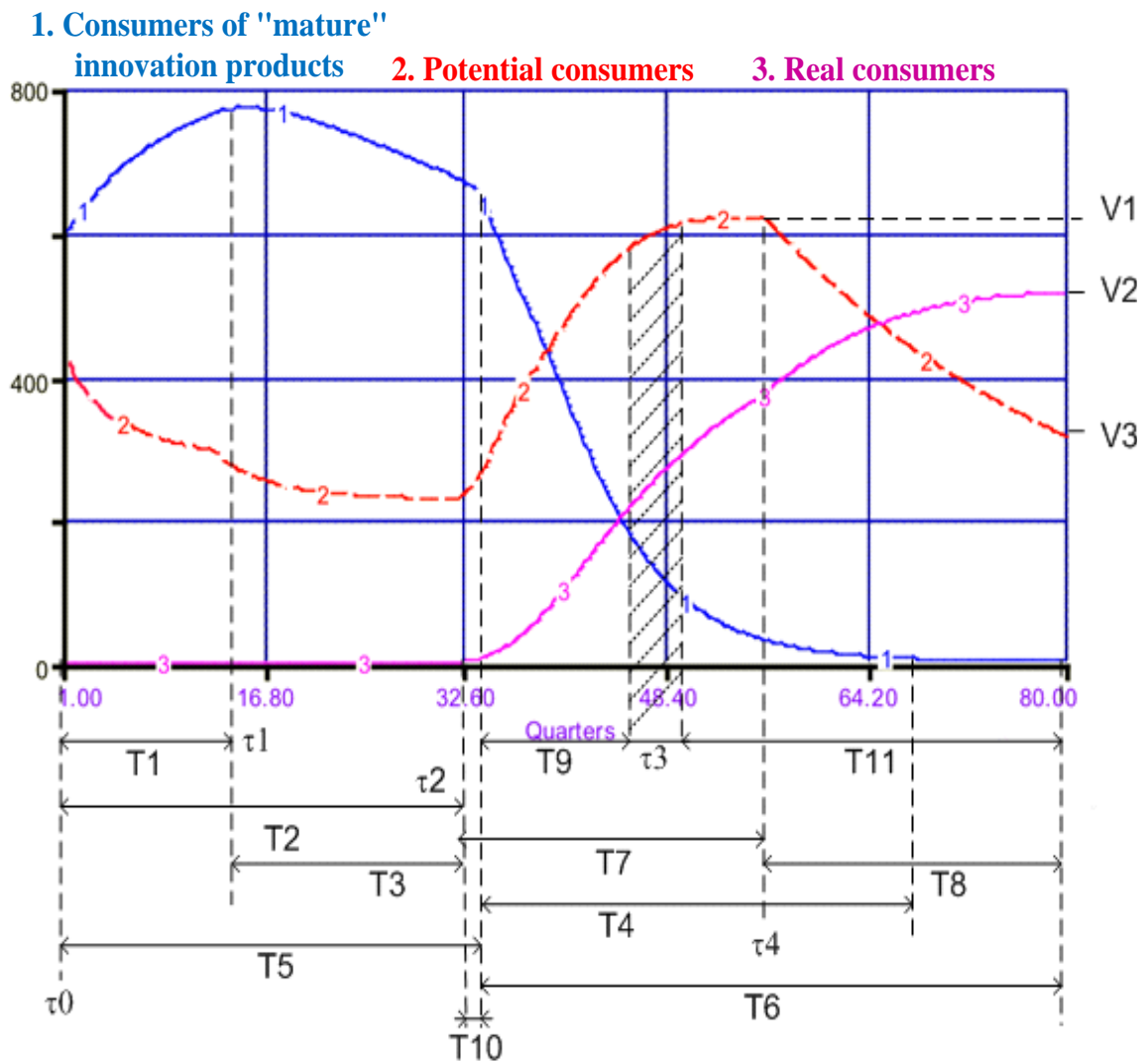
Thus the simulation model of innovation products' diffusion allows estimating the range and speed of innovative products' diffusion.

Based on a series of simulation experiments, we believe that improving the efficiency of innovation products' promotion and distribution should be based on the application of project-based approach.

Each project is a series of logically ordered steps, which are also have all the features of the project (the target settings, time and financial restrictions, criteria and indicators for the effectiveness).

Figure 6 illustrates the graphs of the number of consumer groups of two consecutive innovative projects. The number of consumers of "mature" innovation products increases in period T1 within their life cycle up to  $\tau^1$  due to transition of potential consumers to the category of real consumers.

Figure 6: Graphs of changes in the number of innovation products and consumer's groups



The end of the life cycle of innovation products reduces to decreasing of consumers' loyalty to these products and as a result to declining the number of real consumers of innovation products (period T3).

The point  $\tau^0$  is the start of implementation of new innovation project with improved quality. The duration of the first stage of new innovation project with improved quality is T2.

The point  $\tau^2$  imply the initiation of promotion the "new" innovation products to the market.

Market's response time on the emergence of "new" innovation products is T10. After that the number of real consumers of "new" innovation products formed under the influence of substitution of consumers "old" innovation products(T4) and attraction new consumers from potential number.

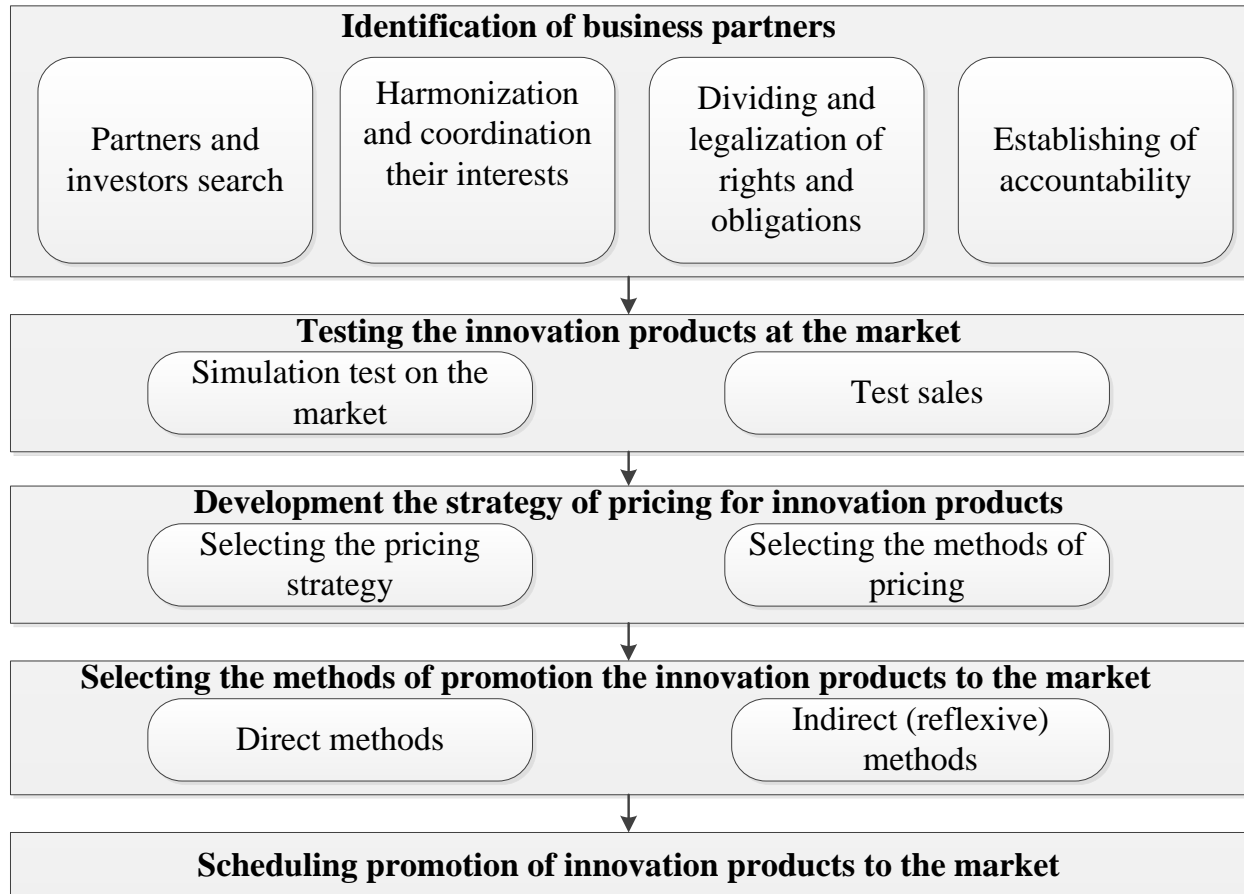
It should be noted that increasing the number of potential consumers of "new" innovation products for the period T7 is the result of their promotion to the market.

The point of the end of the period T7 and the maximum number of potential consumers of "new" innovation products V1 are determined by quality of "new" innovation products, customer value, duration and effectiveness of promotion to the market, especially in period T9 of initial positioning of innovation products and competitive strategy. So, according to the project-based approach to the promotion of innovation products to the market the main tasks are as follows:

- Determining the start  $\tau^2$  and the end  $\tau^4$  of innovation products' promotion to the market;
- Maximizing the number of potential V1 and real V2 consumers of "new" innovation products;
- Prolongation the sales cycle of "new" innovation products;
- Planning the sources of financing of innovation products' promotion to the market;
- Minimizing of periods T7, T9 and T10.

As can be seen from the above the structure of planning phase of promotion of innovation products to the market is illustrated in Figure 7.

Figure 7: The structure of planning phase of promotion of innovation products to the market



So, a range of organizational activities implemented on the stage of promotion of innovation products to the market and associated with scheduling and selection the methods of innovation products' promotion to the market clearly defines subjects of promotion and facilitates the allocation of their authorities, selects methods and limits time of promotion.

## DISCUSSION

When the subjects of promotion are identified, matched their interests as well as are chosen methods and are imposed a deadline of promotion of innovative products to the market, producers of innovation products can move to the next stage of innovation products' promotion to the market - drawing up the budget of the innovation products' promotion to the market.

Then they should assess the competitiveness of innovative products. If consumers' response is positive, producers will enter into contract with them for the supply of a specific quantity of innovation products. Beyond that, the destinations of improving the innovation products' competitiveness due to price and non-price factors will be uncovered.

If consumers have responded not as active as it was supposed, the decision on improvement of innovation products with a view to further promoting to the market will be adopted.

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