

on the basis of a specially designed set of components in the graphical editor of the modeling system. This greatly simplifies the basic processes. Although there are some amendments to this issue. For example, it is necessary to use a specially designed language to define delay functions, transform functions or the decision function of transitions of a hierarchical network.

IEL (IE-net Language) is a developed interpreted language that is used in EMS and allows functionality to be set on IE transitions. It also helps to assign priority functions in IE queues, supports all basic data types and control structures, basic mathematical functions, and comparison operations and functions to generate random variables according to distribution laws.

4. Organization of the experiment

With the help of the experiment subsystem in EMS, a single or multiple run of the model is carried out during a given simulation time.

EMS provides for the solution of problems of strategic and tactical planning of the experiment. With regard to the strategic planning [4] of the experiment, the system provides for only one-factor experiments. In this case, the parameters of the model are assumed to be constant, and one of them is changed over the entire range of values. If necessary, you can sequentially conduct an experiment for each parameter separately.

Regarding the tactical planning of the experiment, EMS provides two options for carrying out the simulation: first, with a predetermined number of runs to obtain each response point at fixed values of the factor; the second - with the determination of the required number of runs in accordance with the rule of "automatic stop".

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INNOVATIONS AS A BASIS FOR DEVELOPMENT OF THE CREDIT SERVICES MARKET OF UKRAINE

The functioning of the credit services market during the years of independence experienced periods of a significant growth, the introduction of new credit services and instruments, and long periods of recession, which were characterized by a significant fall in the national currency rate, high inflation, and a rapid increase in interest rates on credit resources. Such processes have been reflected in the structural and institutional distortions that currently exist in the Ukrainian credit market. It should be emphasized that the introduction of innovations took place mainly during periods of growth, when credit institutions could accumulate appropriate financial resources to finance innovative developments.

The Ukrainian credit services market has been characterized for many years by using financial instruments that looked innovative to the domestic consumer, but have been long time traditional for developed financial markets, and some of them have almost disappeared because they are obsolete. However, the structural distortions of the credit system, which reflect only the structural distortions of the real sector of the economy, where the production of raw materials predominated, did not allow to create sufficient value added to innovate in various sectors of the economy [1].

In the process of studying the impact of innovation on the credit system of Ukraine, it is necessary first of all to establish the main trends in the development of the credit sector. Comparative analysis of the basic indicators of the Ukrainian market with similar indicators of Poland and the European Union (Table 1) indicates a significant lag of the domestic credit market from Poland and the EU.

Table 1 - Basic indicators of market activity,% of GDP

Indicators	2017	2018	2019
Gross savings			
European Union	20,4	21,0	20,7
Poland	16,2	17,9	17,9
Ukraine	17,5	15,3	15,6
Domestic loans from financial institutions			
European Union	153,9	150,5	150,7
Poland	62,6	65,0	63,0
Ukraine	93,9	87,1	87,5
Market capitalization			
European Union	62,3	51,1	60,3
Poland	39,9	25,4	35,8
Ukraine	28,9	15,6	11,7

Source: [2]

Comparing the above indicators, it can be argued that the domestic credit market during the analyzed period was characterized by a relatively low (about 15%) propensity of economic entities to save, which significantly complicates the ability of financial intermediaries to attract financial resources, which leads to a limited access to physical and legal entities to credit resources, limiting and slowing down economic growth. An interesting trend is the level of lending activity of financial intermediaries in the domestic market. According to relative indicators, the level of credit activity of domestic financial intermediaries (87.5% in 2012) is even higher than the level of Poland (63.0% in 2012).

At the same time, it is worth knowing that each of these markets has certain features. Thus, the large volume of lending in Ukraine affects not only lending activity, but also large volumes of sad and problem loans in credit institutions, which lead to the fact that some of them arose during the World Financial Crisis 2008-2009. Firstly, Poland is characterized by a special behavior of Polish borrowers who try to minimize borrowed resources, mostly exploration of public financial resources, which is positive in the financial crisis and credit market. Poland is the least affected market among the EU financial crisis. Secondly, the Polish credit sector is characterized by a large share of foreign capital, which allows financial intermediaries to attract financial resources in the Polish market, to invest them abroad. The EU credit market, on the other hand, is characterized by a fairly high level of borrowing of financial resources in foreign markets. Thus, it is obvious that the structural preconditions for the intensification of the financial market of borrowed resources are not favorable enough.

All these macroeconomic structural imbalances are due to the underdevelopment of the credit services market in Ukraine and the lack of innovative and quasi-innovative products. The latter include traditional financial instruments and products that are widely used in developed economic systems, but have not yet become widespread or absent in the domestic credit market.

It should be emphasized that credit innovation is not such a fundamental area of investment in European countries (Table 2). In 2011, the average investment in credit innovation ranged from the lowest in Poland (0.30% of total R&D investment) to the highest in the UK (1.74%). However, despite relatively low investments, the level of development and consumption of innovations remains high.

Table 2 - Investments in innovation in the financial sector

Country	Units of measurement	Years		
		2016	2017	2018
Poland	million dollars	20,727	8,352	5,868
	% R&D	1,49%	0,55%	0,30%
Germany	million dollars	415,080	291,945	335,094
	% R&D	0,74%	0,50%	0,51%
Great Britain	million dollars	580,321	504,105	434,863
	% R&D	2,43%	2,17%	1,74%
Czech Republic	million dollars	35,315	35,943	34,881
	% R&D	1,70%	1,64%	1,35%

Source: [3]

Thus, the analysis showed that the development and consumption of innovative products requires several prerequisites. First, institutional compliance of processes and rules with the mechanisms of development, implementation and functioning of innovations, that is institutional and infrastructural compliance. Second, structural readiness of various sectors of the economy and households to consume new credit services, tools and products, that is public demand for innovation. Third, financial culture of consumption of traditional and innovative credit instruments, products, services.

The creation and development of credit innovations is significantly limited without the formation of an appropriate level of financial culture of all economic entities, the system of which should be comprehensive, integrated into the public life and cover the subsystem of financial literacy, financial responsibility, financial planning culture and credit innovation subsystem. The formation of such a system will be able to ensure the creation of appropriate conditions to overcome existing structural distortions and imbalances.

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