

Picture 2. Optimization for credit risk management system

So, credit risk management system by applying System Dynamics approach was studied. The basic influencing factors were identified, a causal loop diagram was constructed, and the SD model was developed. The basic logic of lending stability lies in balancing "rigidity" of risk management system. SD approach allows evaluating behavior of consumer lending in dependency of risk attitude.

## References

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## POLICY FOR IMPROVING MORTALITY RATE IN THIRD-WORLD COUNTRIES

This project presents the development of the problem of high mortality rate in third-world countries and suggests two possible solutions of dealing with this issue using system dynamics modeling approach. The model consists of explanatory part, which represents the health sector of typical developing country, and two policies, which were built according to sustainable development principle. The model was built based on analysis of statistics and historical data of developing countries like Zambia, Nigeria, Namibia, and Ghana, where the high number of deaths appears to be one of the biggest problems of socio-economic life.

The main concept is *mortality rate*, which is a measure of the number of deaths in a particular population scaled to the size of that population. Mortality rate is expressed in units of deaths per 1,000 individuals per year.



Figure 1. Diagram of reasons of deaths

One of the crucial variables, which influences mortality rate is access to health care. It was detected, that only less than 24% of population in 2018 has access to basic health services in such countries.

First policy is focused on improving the situation with access to basic health care by buying equipped, professional ambulances in the health centers that will increase the coverage of the health centers and ultimately will have positive impact on the access to basic health care for the whole population. According to data in 2018 there were 0 equipped ambulances. To achieve the policy target of 90% for proportion of area covered by ambulances, government has to provide health centers with 100 ambulances by 2040. The process of buying the ambulances considers the gap between the desired proportion of area covered by ambulances. This forms a balancing loop and reaches goal till 2022.



Figure 2. Policy for increasing access to health care

Second reason of such high level of deaths in third-world countries is lack of qualified health workers – doctors of different specialization, nurses, medical workers of health centers, who can provide people with first aid. According to statistics, there can be approximately 1000 doctors with high education for the whole country.

To receive higher number of people, who get professional medical help, the task is to increase density and distribution of health workers. Their number depends on the annual number of people who need qualified help and health workers productivity, which is1500 people per worker per year.



Figure 3. Policy to receive the higher number of health workers

To define the magnitude of the impact of these two factors, there were calculated elasticity of number of people dying to access to health care and to number area covered by ambulances. Based on historical data about access to health care and mortality rate, it was proved, that elasticity between these two concepts is very small and equals to -0.016. Elasticity between proportion of people who get medical care and maternal mortality rate equals to -0.038.

Number of people dying is influenced by absence or existence of these two factors, so, in order to show this influence, there were created two effects, which count how many people die because of lack of access to basic health care, lack of qualified health workers.

The effect of impact of access to basic health care on fraction of people dying from lack of access to health care is the following: If 0% of people have an access to basic health care, then population dying from lack of access to health care equals to annual number of people who need help by 0.015. If 100% of people have an access to basic health care, then annual number people who need qualified help multiplied only by 0.00005.

Second effect identifies the impact of attendance of professional workers on fraction of people's death. If proportion of people who get health services to people who need help equals 0, then people dying from lack of qualified workers equals to annual number of people who need help by 0.07. If 100% of people get heath care, then annual number of people who need help is multiplied only by 0.005.

Also, the fact that population can die because one of two reasons or a combination of them should be taken into consideration. If overlapping factor equals less than 1, then people dying because of two reasons named above are summed. If

overlapping factor equals to 1, then number of people dying equals to maximum of number of people dying because of one of two reasons.



Figure 4. Diagram of the effects, which have impact on mortality rate

As we can see on Figure 5, without any policy the mortality rate goes down very slowly. In 2018 it is equal to 15 people per 1000 and up to 2040 it drops to 11. Having provided the policy for access to health care the government can reach the reduction to 9 deaths per 1000 people in 2040. If the chosen policy is policy for hiring qualified workers, then, the government can receive the result of 6 deaths per 1000. However, the most efficient variant is the combination of two policies, which can reduce the mortality rate in the country to 4 per 1000 people.



Figure 5. Graph of the results of policies' implementation

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## APPROACH TO MODELING THE ACTION OF TRANSMISSION MECHANISM THROUGH THE INTEREST RATES OF COMMERCIAL BANKS

Transmission mechanism is a system of interdependent economic variables that transmit certain impulses from monetary policy instruments to the financial market and the real sector of the economy. Therefore, the transmission mechanism is a broad concept, which includes not only the relationship of the monetary variables with the real sector of the economy, but also the process of regulating the economy through the monetary impact on aggregate demand and the aggregate supply of all economic agents. The concept of the monetary transmission mechanism related to the implementation of the regulatory policy by the Central Bank.

There are many factors affecting the transmission mechanism in the economy. It depends on specific economic conditions, the structure of the country's financial system and the methods of monetary regulation that are inherent in a country, as well as on the behavior of economic agents. The effects of monetary regulation for developed countries and for developing countries differ significantly. For example, in countries with high inflation monetary policy has a much lower impact on aggregate demand than in countries with low inflation. This is reflected in various monetary indicators and models of the transmission mechanism.

One of the main channels of the transmission mechanism is the interest rate channel. The interest rate channel describes how changes in discount rate affects interest rates of commercial banks which in turn affects savings, investment and price stability. Many countries in their monetary policy use this channel, especially when the monetary regime is inflation targeting, in this case, this is the main channel. The effectiveness of this channel depends on economic conditions in country.

In a simplified form, the scheme of transmission mechanism functioning in Ukraine looks like:

1. National Bank of Ukraine (NBU) determines the discount rate;