SIMULATING INFORMATION POLICY MAKING

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ABSTRACT

Recently it has become obvious that the creation of an information society in accordance with the eEurope objectives presumes governmental support. The programs and action plans, that are to support and accelerate the transition, have been developed in almost every country. However, at developing the strategy the policy-makers have to consider the complexity of the environment and the diverseness of potential effects. This complicates the forecast of the impact of the different measures. The scope of the research was to set up a model in order to support decision- and policy-makers. With the model the ones responsible will be able to estimate the impact of different measures, and the alternatives can be compared with each other.

INTRODUCTION

Since the possible advantages of the development of Information Society and the disadvantages of a delay have been understood the decision-makers have tried to support the development. The decision-makers can use many tools to support the development of Information Society. Some of these have a straight effect on the economic processes. These are the direct economy stimulating steps, the effects of which are easily measurable and can be simply evaluated. Nowadays these direct influencing tools are being replaced with indirect solutions. Their effects usually last longer and affect every actor of the economy, but the evaluation of the results is highly complicated. Such indirect tools in building the information society are:

- Citizen friendly administration
- Improvement of education and health care
- Improvement of administration

The fact that the decision makers cannot foresee the necessary resources for the actions can raise difficulties when forming the specific plans. The complexity of the problem comes from the chain reaction possibility of the effects of our interventions. An accelerator effect is also present because of the connections of the economic participants. This acceleration drives the effect of the action even further and causes further changes. This way of acting has an impact on every actor but the results can only be observed later.

This accelerator effect and its impacts on the economy must be estimated and it must be built into the model in order to achieve a more effective decision-making. Nevertheless the governmental actions bring results that can hardly be measured. Such result is for example the higher sufficiency of the customers caused by a possible improvement of public services. Despite the difficulties in their evaluation the impacts of these actions cannot be disregarded.

Another important problem is the estimation of the time factor during the development of the action plans and measurements. After some time supplementary support could be necessary in order to achieve our original goal. However, the final goal is to establish a self-sustaining system by making self-financing possible. An indispensable condition for this is the creation of an economical balance where the supply and demand of the services are more or less equal. As long as the society cannot achieve this aim, supplementary actions are necessary. We can see that forecasting whether the necessary balance can be achieved with the current preconditions and predicting the time when information society will reach the state of sustainability have a high importance.

On basis of the problems mentioned above, the need for a method to determine the effectiveness of governmental actions in different areas is apparent. Neither the EU strategies nor the national initiatives provide a measurable technique to define the desirable points of intervention and to evaluate the effectiveness of the actions, although they do contain indicators for estimations. With Hungary's accession to the EU a proper method to measure the effectiveness of spending is even more substantial. To be able to use the EU funds in an efficient way a weighting system for the different areas is essential. To solve these difficult issues a modeling approach is very suitable. Our research has been aiming at these questions.

Recently our team have came across with the very active Information Society related information policy making, due to the above the average government

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commitment of speeding up internet and internet related services penetration. Under the framework of the National Research and Development Program a two years research project were launched in 2001 aiming the investigation of the sociological, economic, administrative and technical preconditions of the more intensive development and progress. Our team focused on the macroeconomic modeling and forecasting. The model have been developed is suitable for testing and experimenting several type of policies, the scale goes from the orthodox Keynesian approach to the ultra liberal type of decisions.

The System Dynamics is one of the most powerful and well-acknowledged simulation tool for modeling - amongst other - macroeconomic decisions. Applying System Dynamics in the modeling of information society is also quite unique in our research. With this methodology it is possible to give advise for the decision-makers about the most effective ways and the most effective points where spending can have the most beneficial effect on creating the information society.

MODEL DEVELOPMENT

The action plans are made to help obtaining the main goals by creating actions to draw the real situation towards them. However, we have encountered a few difficulties already. During the creation of action plans we have to face some problems, as during the decomposition one has to pay attention not to lose the original focus. It can often be experienced that our action plans are defocused and they are not able to support us in answering the original question. Another problem factor is getting realistic feedback on the process to achieve our goals.

Naturally, the development of the actions must be continuously observed in order to bring in the necessary corrections. These results however, cannot be defined in all cases and the collection of data can cause difficulties. For this purpose we used the aspects of the eEurope Benchmark 2005 (eEurope 2005, 2002).

The European Commission has drawn up a list of twenty basic public services to be benchmarked. These include twelve public services aimed at individual citizens and eight for businesses. By identifying the main factors of the Information Society, these benchmarks offer help in the structure for data collection and can be used as starting points for model creation. The benchmark indicators ensure the international comparison as well.

To minimize the foreseeable difficulties we decided to use System Dynamics (SD) tools for modeling, research and interpretation of the results (John D. Sterman, 2000). System Dynamics – a technique created almost half a century ago (Paulré 1980) – made it possible to represent the factors of Information Society in all their detailed complexity. SD also helped to form the model in a way that it helps in creating deductions regarding the operation of real-life processes. The model itself was created with the help of the SD modeling software VenSim. Developing a useful model is difficult enough; using modeling to help implement new policies is even harder. As in our case the basic data were incomplete and the actions of the sub-systems were hardly predictable the deployment of a well-formed framework was a must. Since effective modeling rests on a strong base of data and understanding of the issues, the rules and instructions of framework inspired us to disclose the problems thoroughly.

MODEL DESCRIPTION

The model reflects to the findings of a recent done nationwide research in which the relevant influencing factors of the penetration of the information society (IS) paradigm were thoroughly investigated. The sub-models are working with statistical variables, mainly defined by the EU Benchmark 2005. The logic of the model can be demonstrated with the following figure.

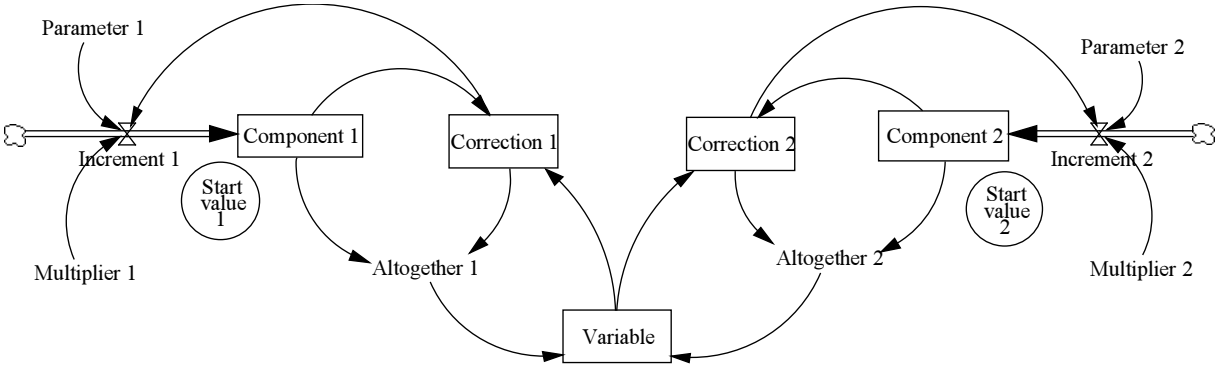

Figure 1: The Logic of the Model

In the model each variable is made up of some components. During the examination of the simpler parts we only have to consider the effects of two components at the same time, but in the more complicated parts of the model the development of the variable is influenced by more than ten components.

We have statistical data for the value of the variables to start with that later can be regarded as given values. During the simulation, these start values are increased by the multiplier that can be established with statistical data series or with professional estimate. The development of the components can be influenced by the acceleration rate through the alteration of other variables.

By taking these factors into consideration the values of the components valid for the given period and determine the value of the desired variable. The appropriate weights of components permit the differentiated consideration of the effects. The components have to match the value of the developed variables. The corrections reduce the potential failure of the model, as without correction the value of the components can secede from the weight of the variable. With the correction we can ensure the consistence of the simulation model.

The complex model is built up from of seven sub-models:

- E-economy (B2B, B2C)
- Quality of Access (Expenditures on Security)
- Infrastructure Development
- Public Service / Administration (services for individuals, services for enterprises)
- Corporate Access and Use
- Individual Access and Use
- Tariff, which are connected to each other.

The scheme of the model can be seen on the following figure.

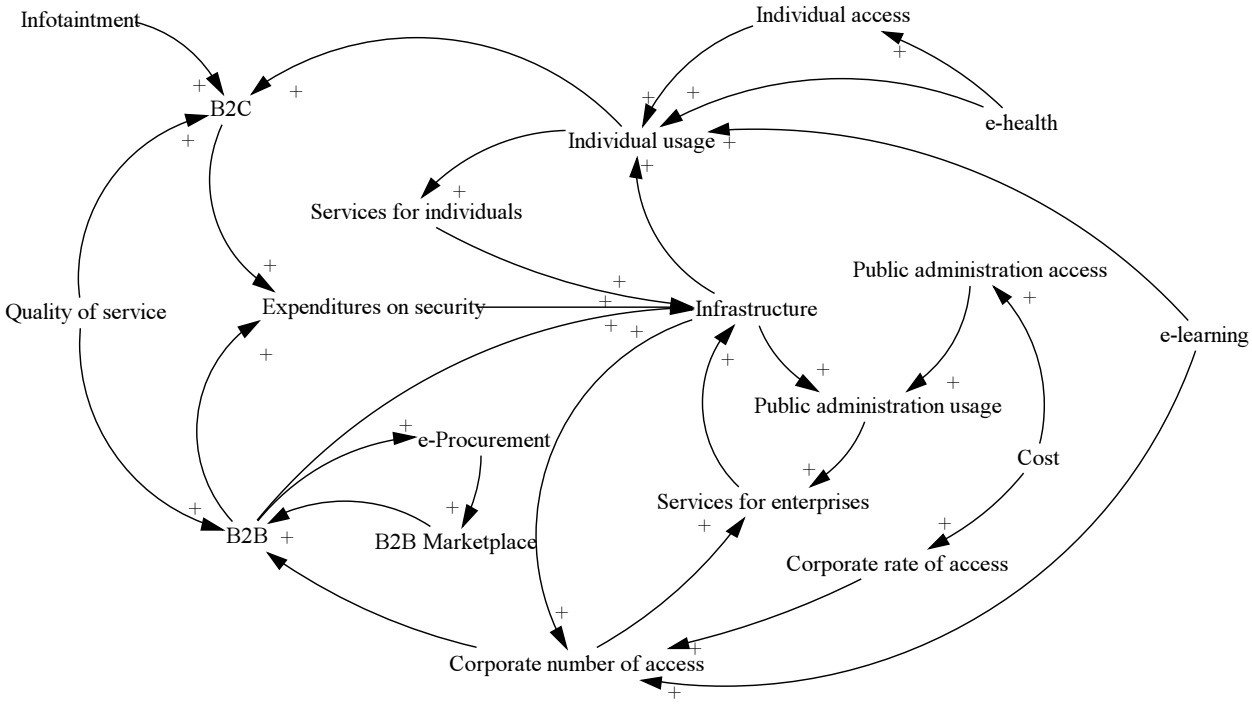

Figure 2: Overview of the Information Society Penetration Model

Each sub-model contains 2 to 12 components, connected through the growth ratio. The connections between the sub-models are inserted with specifiable parameters, therewith assuring that the strength of cross-effects can be regulated. The accelerator effect influences the growth of the individual areas in a direct or indirect way. As the growths of the different partitions are not the same, the indicators' value will lead to several combinations. The model starts with realistic statistical values and the different strategies and policies are translated into the concrete values of the growth parameters.

The SD model is implemented in Vensim 3.0.

MODEL SCENARIOS AND RESULTS

The model can be used to conduct several simulations depending on the scenarios and partly on the decision makers' attitude (more market-oriented or committed to the public expenditure).

These scenarios are constructed on the basis of different preconditions – supplemented with the examination of sensitivity – and they are giving the most important results of the modeling. The results of the model were examined in seven scenarios: (1) a realistic situation, (2) Public service dominated scenarios a) Public services for individuals and enterprises b) Infrastructure development c) Public e-procurement enhancement, (3) Competitive sector dominated service scenarios a) B2B b) B2C c) E-health.

Applying the methods detailed above a multitude of simulations can be made and various conclusions can be drawn. In this paper we can only illustrate the most important implications regarding the two basic concepts: public service dominated scenarios and competitive sector dominated service scenarios Further analysis still can be made. The interpretation of data is always partly affected by convictions; however in this case the results of simulations create a well-defined and determinate basis.

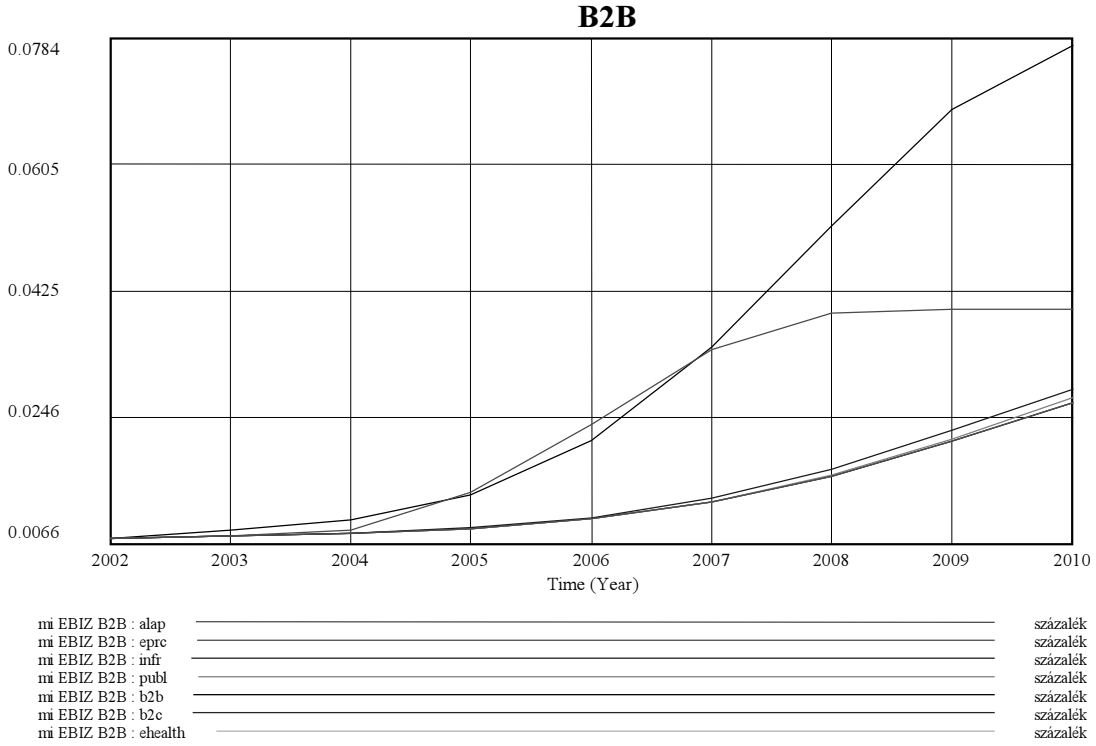

Figure 3: Business-toBusiness EC

The main question of our research was whether the development of internet-penetration is the task of the government or public organizations. In order to answer the research question, the impacts of 6 examined approaches have been compared in selected key areas. The results are the following:

- In order to develop B2C commerce market solutions and the improvement of market organizations are more adequate comparing to other approaches, which require governmental sponsorship.

- In the area of B2B commerce both market and governmental intervention can be successful. Beside the market based development of B2B, the introduction of e-procurement can support this area, which is strong governmental role.

- The development of infrastructure can be based both on governmental and market resource. In short term the direct development (infrastructure investments, subventions) can be the most successful, but in long term the other approaches have approximately the same effect. All approaches based on government service improve the state of infrastructure, while among the market-based approaches the development of B2B has the most powerful effect.

- The individual and corporate usage of Internet can be improved by both approaches. The familiarization of users to Internet by means of other services has the most powerful effect in this area (services of e-health or public services for individuals or enterprises). The development of the infrastructure can improve the usage of Internet, as well.

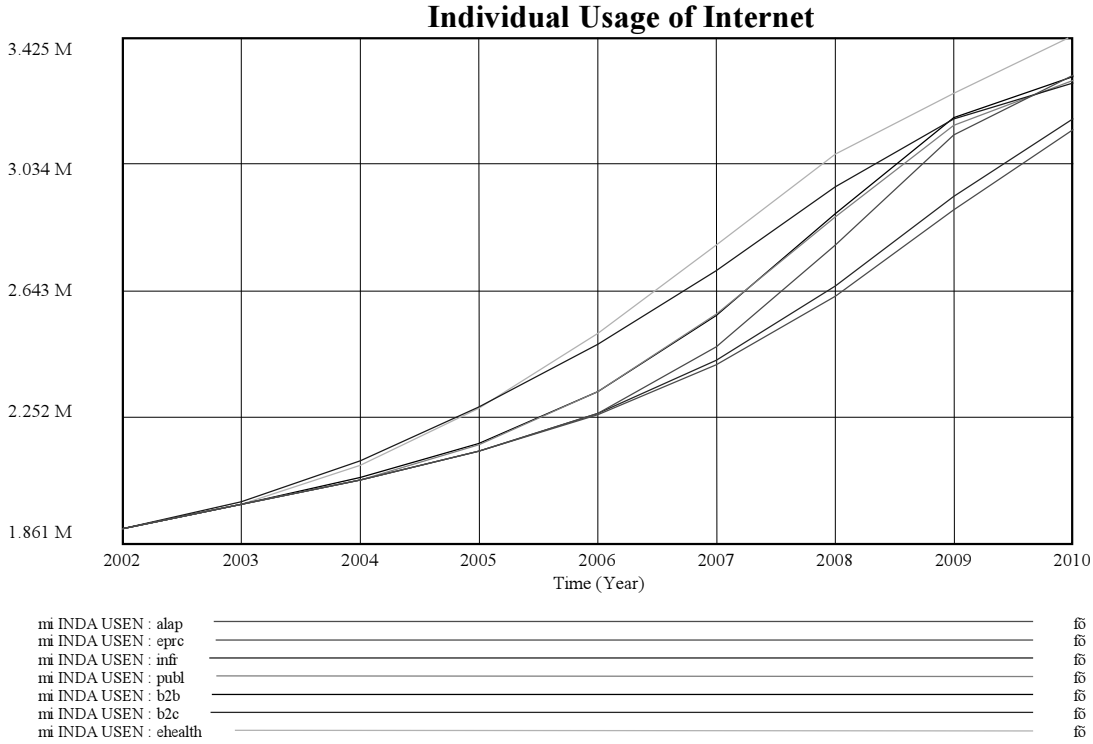

Figure 4: Individual usage of Internet

All this concludes to the implication that Information Society building requires the intervention of the government in the short terms, however the penetration is expected to grow by itself – or rather by the actions of the participants – from a point onwards. The Information Society can become a self-sustaining system.

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