

LAUNCHING NEW IT PRODUCT INTO THE MARKET

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Abstract Bringing a new IT product onto the market poses a high business risk due to two main factors: lifetime of an IT product is usually short; IT market is very competitive one. Product success depends on many mutually linked factors and very often the relations among them are difficult to grasp by business analysts. In the paper we present the System Dynamics model describing some important factors which should be analyzed before bringing a new IT product onto the market. We assume that an IT product is maintained within an outsourcing model by other company which uses a cloud computing for that purpose. Our study embraces analysis of the pricing policy of product and that takes into account opponents in the market. We also consider possible modifications of IT product configurations, outsourcing scope and the modification of marketing policy depending on actual IT product parameters. While building the model presented in the paper, contrary to other models in literature, we have used only parameters which can be estimated precisely. By sticking to this attitude we have obtained the model which is more useful than other models presented in the literature on the subject. We present simulation results of the dynamic model for different simulation scenarios resulting from different policies of bringing a new product onto the market.

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1. INTRODUCTION

Process of launching new IT product into the HI-TECH market is driven by several important factors. First of all it is very competitive market and life-time of IT products is very short (Cui, Zhao & Ravichandran, 2011). Secondly the success of the product launch depends on taking into account such factors as preferences of the clients which should be interpreted as increasing requests of clients to the product functionality when the product is remarkably priced at the market (Hultink, Griffin, Robben & Hart, 1998). The proper strategy collaboration for a product launching is a key factor of product market success (Gultinan, 1990). Some researches show that in case of some HI-TECH products the cost of launching a product to the IT market (interpreted as money needed for promotion, time and resources) is one of the most expensive phase in a product life cycle.

There is quite vast literature describing factors on which successful launch of a product into market depends on. But according to our knowledge there is no article modeling the process of bringing new IT products onto the markets. For example the authors modeling a product launch process take into account: its price, time of entry into a market and the distribution channels (Coffray & Lilen, 1984); product quality implied as a technology advantage and some R&D expenses (Green & Ryans, 1990). Other authors take into consideration usually marketing expenses, or the additional component configurations. Many of these factors have been incorporated into our model.

Some authors divide the success factors of launching a product into two main categories: strategic and operational factors (Choffray & Lilen, 1986) (Calantone, Chan & Cui, 2006) (Li & Jin, 2009) (Niewiadomski, Pawlak, 2015). First group consists of the distribution channel, product replacing strategy in a producer's product set (when new product replaces the old one), total and comprehensive marketing strategy of a product. Second group consists of the pricing decisions, product promotion strategy for the actual clients, the distribution models, the quality assurance procedures (described in some detail in this paper). In our model we concentrate on the tactical factors of product launching.

In this paper we describe the real model for the cost estimation of a product launched into the market.

The product we consider in the paper is the financial report consisting of some financial information about a company financial condition, used later, for example, to calculate the scoring, or rating grades of the company. A company that sells that kind of reports have an access to information from the banks and/or other financial institutions, or other databases approachable through the market. The company selling the product acts as a data integrator in a scope of gathering and distributing financial information. Nowadays the UE law allows such companies to produce and sell reports describing the financial conditions of other companies. These reports play important role in minimizing the operational risk of the companies

which want to check their future partners.

In an analytic process of product launching some important assumptions are made. These assumptions affect the model. First we assume that our company selling reports uses an IT outsourcing model and the so called cloud computing model. These services allow that company order and release any number of needed resources (administrators, servers, network devices etc.) any time the company wants - this is specific to the cloud computing and outsourcing models. This flexibility improves the competitiveness of the company. Another assumption is that we allow to buy any volume of financial additional databases by the company – data integrator. Both these assumptions are true and rather easy to fulfill in practice at modern markets.

Main feature of the product being offered at a market by the company is that it consists of as many financial subreports, gathered from different sources, as possible. So the quality of the offered product depends on content and volume of the company (and its partners) databases. What is also important is the time of the report preparation, it should be very short – usually up to few seconds. That kind of requirements are usually put by the telecommunication companies which want to gather information about their clients very quickly.

Presented model is built according to Forrester's methodology notation used to model dynamic processes (Sterman, 2000).

2. DYNAMIC MODEL OF LAUNCHING IT PRODUCT INTO THE MARKET

2.1. Product reception by potential customers

Presented model consists of a few logically divided components. The first component represents the model a potential customer market and its fluctuation according to different determinants. There is one important determinant depicted as a state variable *CUSTOMER GOODWILL* widely used in the literature (Cui, Zhao & Ravichandran, 2011) (Haverila, 2013). In our model, taking into account the specificity of the presented product, the model of *CUSTOMER GOODWILL* (which describes the goodwill of purchasing new product by the customers) is slightly modified.

One may easily spot at that market the most important determinant conditioning the receipt of the product. In this case the market opinion about the service quality delivered by the producer affects the most the product perceiving. In our model we name this variable as *avg service rate opinion (Asro)*. In the beginning this variable behave randomly, this is due to the fact Asro depends on the Service Level

Agreement and its points can be initially broken because of technical problems of the company selling the product.

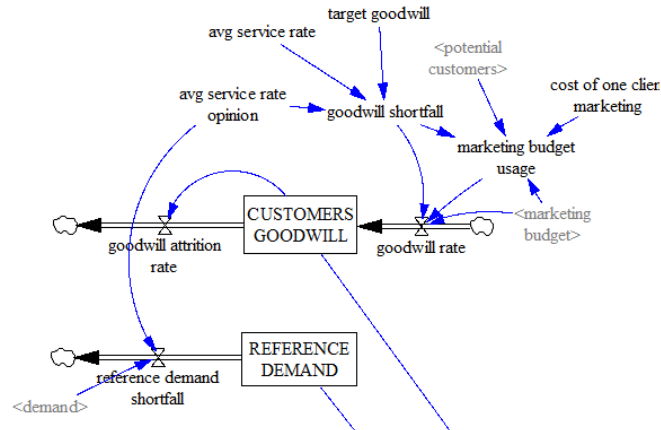


Fig. 1 Elements influencing a value of the state variable Customer Goodwill

SLA parameters cannot be held by the producer because of breakdowns of any IT element in its service line, for example breakdown of IT infrastructure for sending and receiving messages called ESB (Enterprise Service Bus). However one may assume that value of Asro will increase during the product life cycle, but as marketing researches show, there is almost impossible to gain 100% of a client satisfaction. In our model the parameters value are fixed to allow us to analyze the use of marketing budget applied for effacing bad impression emerged after any breakdown of the producer IT software. The use of marketing budget aims at creating better opinions on the product. Utilization of the marketing budget reveals as better opinions about producer. In the first phase of the product life cycle when these product reception isn't satisfying, the marketing budget cannot be sufficient to attract customers.

2.2. Managing the number of sold reports

The number of the potential clients for a product has got a crucial influence on the number of sold reports. The number of the potential clients depends on the product price and the product reference price. In the literature one can meet such link among the reports and their price and we didn't make any crucial modification of this rule in this paper (Cui, Zhao & Ravichandran, 2011). The number of the potential clients is reduced by the rate of the product response at the market which can be estimated and is usually known at the marketing departments. A new feature in our paper is the introduction of the method of estimation of the real number of the clients interested in the product offer (in the product purchasing). This is linked with

the product quality. This quality can be precisely determined for this kind of IT products. In this way the real number of sold reports any day of the product life cycle (denoted as state variable *SALES*) can be determined as the difference between daily sales and the daily product agreement cancellation (*contract adoption rate – contract attrition rate*).

The existence in our model of the component related to the agreement cancellation by clients during the product launching phase makes our model more realistic. In case when the products are being offered as the agreements for the given periods, the cancellation processes arise very often. So this parameter has to be taken into consideration to guarantee the adequacy of our model. A variable that describe the number of clients lost by the producer (the number of clients that cancelled their agreements) is described as: $avg\ service\ rate\ opinion * SALES * 0.001$.

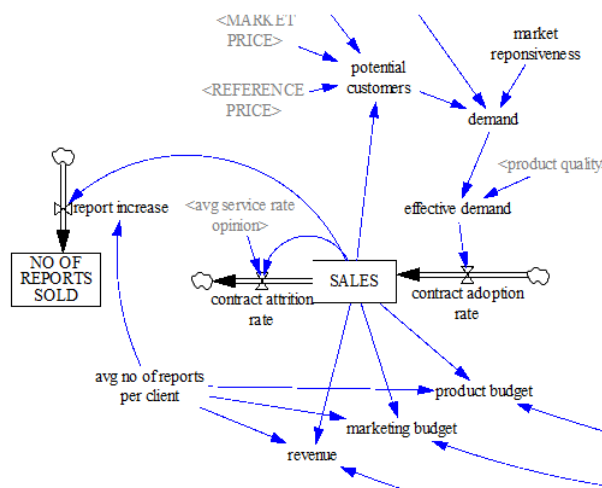


Fig. 2 Mutual attitude among the number of sold reports and the demands

Our experiments show that this is a very realistic model. In our model we set up a parameter describing an average number of bought reports per day. This value can be estimated using the historical data. Depending on the state variable *SALES* one can estimate precisely the number of sold reports per day. Using this variable one can calculate an income from the sold reports. This income will be divided between the marketing department and the production department. The rest of funds will be treated as the company revenue. For our simulation experiments we assumed fixed division among the marketing costs, the production costs and the revenue. If the simulation model were to be substituted by the optimization model these parameters could be treated as optimization variables – then the computing environment described in (Pytlak, 1999) (Pytlak, Tarnawski, Fajdek & Stachura, 2013) (Pytlak, Błaszczuk, Karbowski, Krawczyk & Tarnawski, 2013) could be applied to the optimization problem.

2.3. Calculation of a product market price

Product market price is a function of two important variables in our model: *product quality* and *price* that is accepted for potential clients. First variable – *product quality* – is linked with *hit count rate* parameter which describes how many reports bought by the clients have got negative market information about the company being checked (the negative information consists of information about the unpaid loans, or other kind of debts). These negative reports usually force the adequate actions made by the company that got these reports. For example, it may be a contract cancellation, or making the changes in an agreement that secure the client business.

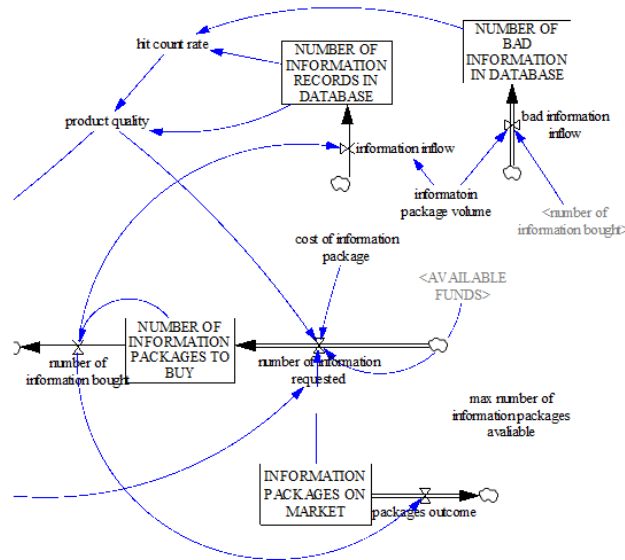


Fig. 3 A process of accessing the databases containing the financial information

One may easily approximate a hit count rate because the market analysis is published very often by many economic institutions that check the financial stability of the companies divided by the sectors. So there is only one task for the report producer – to possess as many databases as accessible in the market. A process of accessing that information is shown in Fig.3. Hit count rate is calculated as the ratio of the number of the negative financial records in the databases to the number of all records in the company databases. The very important problem modeled in the paper as dynamic submodel is how to estimate a moment when a report producer should buy the additional databases. We assume in the paper that the number of the databases which can be bought is known and countable, and that is fully justified assumption. Value of the variable *Number of information requested* (*NoIGreq*) decides when additional databases should be bought.

IF THEN ELSE(product quality < OPONENT PRODUCT QUALITY,
 $\max(0, \text{MIN}(0.5 * \text{AVAILABLE FUNDS} / \text{cost of information package},$
 $\text{INFORMATION PACKAGES ON MARKET}))$, 0)

In practice a producer can't afford to buy the maximum number of databases which exist in a financial market and can be purchased by a report producer. But to simulate and especially to optimize the model we must remove these constraints to allow a solver precisely calculate the values of all the model state variables (Pytlak, 1999). In other case the values of these state variables could be unnecessary constrained and in effect this would cause suboptimal trajectories of these state variables. Buying decision is made when the competitor product quality is higher than the product quality of the producer. Estimation of the product qualities is rather a difficult process but can be made. In general the competitors know their hit count rates that are reached any moment, with the estimation margin up to 2%-3%.

In our model we introduce the state variable *OPONENT PRODUCT QUALITY* used to describe making decision of buying the additional databases with financial information. This state variable is continuous and increasing in the case of the worst scenario for the producer when its competitor has improved the quality of its product. We introduce additional constraints to prevent the model from making a decision of spending all of the funds for buying the databases. So only 50% of budget can be used to purchase these databases in each simulation step.

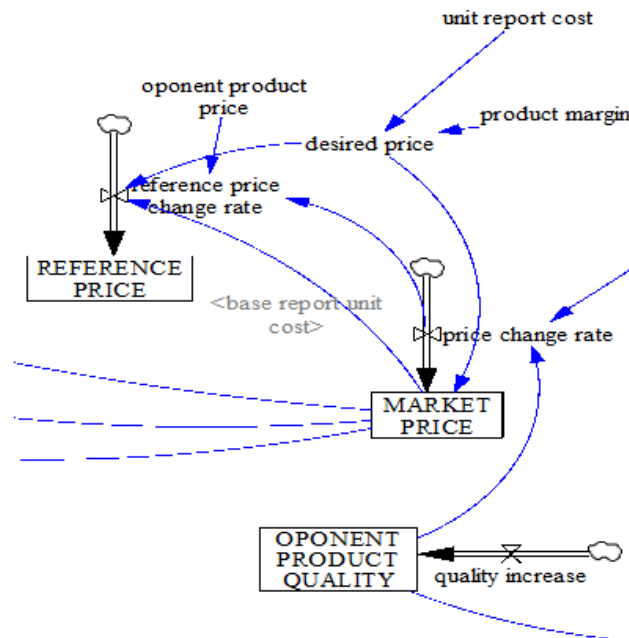


Fig. 4 Relation between a product price and a reference market price

The submodel for the calculation of a report cost consists of a few cost parts: a fixed cost of a base standard report (fixed during a product life cycle), cost of the additional report options (additional and nonstandard information), cost of the additional service made by an outsourcing company and a cost of the additional computing power during some periods.

In our environment – cloud computing – one may regard that the costs of the additional service and the additional power can be modified day by day. It is a cloud computing standard and advantage. One has to estimate only the minimal requirements for his systems. Additional elements of service can be purchased at the price which is usually linearly increasing.

We added a product margin to the cost of any report. During a simulation a margin is a model parameter. In case of optimization a margin could be a variable (constrained with a minimal value). Additional server power needed (counted usually in the CPU number – the number of processors) is calculated as follows:

$$\max((\text{SALES} * \text{avg no of reports per client} - \text{min base number of reports sold}) / 2000, 0)$$

where:

min base number of reports sold – the minimum number of the reports covered by the fixed agreement price

*SALES * avg no of reports per client* – the number of the reports sold the last day

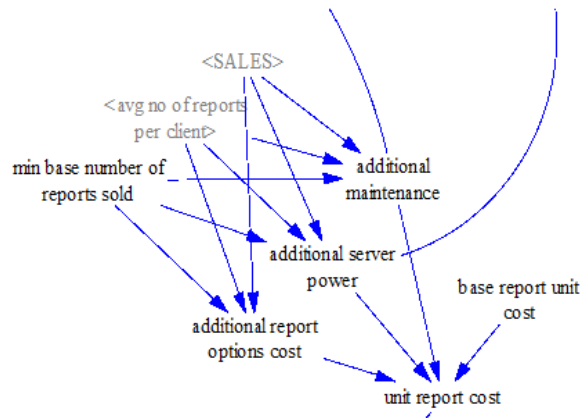


Fig. 5 Estimation of the outsourcing parameters

For the model simplicity we assume that one additional processor is needed when a volume of purchased reports increase is equal to 2000 reports per day (this parameter can be estimated quickly by the administrators of IT systems). In real environments these numbers are verified daily by system administrators. A main scope of that process is a precise estimation of the report number when one has to add a processor to satisfy the SLA parameters.

A market price is modeled as the state variable *MARKET PRICE*. Value of this price is calculated in any simulation step (in our model we assume that simulation step is equal to one business day) according to the equations:

$$\begin{aligned} \text{MARKET PRICE} &= \text{price change rate} * \text{desired price} \\ \text{price change rate} &= (\text{product quality} - \text{OPONENT PRODUCT QUALITY}) * 0.001 \end{aligned}$$

0.001 coefficient is used to model a slower client reaction when a product price changes and that happens for the clients that can purchase reports because has got subscription. This kind of clients are not keen on quick changes of the report providers. The reference price is assumed to be a price which could be proposed to any client. We calculate this price as:

$$\text{REFERENCE PRICE} = (0.2 * \text{MARKET PRICE} + 0.4 * \text{desired price} + 0.4 * \text{oponent product price}) * \text{price change rate}$$

It is important to consider the assumption taken in our model that a producer should analyze its own costs and competitors product prices but an actual product price isn't very important. This way of modeling a product price allows producer to differ its own product cost elements and also opponent costs from the cost elements calculated on the base of the products quality comparison. The prices calculated are used when the potential number of clients is estimated:

$$\text{potential customers} = \max(0, (\text{REFERENCE DEMAND} - \text{SALES}) * \exp(-0.5 * \text{MARKET PRICE} / \text{REFERENCE PRICE}))$$

2.4. Sales budget correction

Sales budget used for marketing efforts and sales support consists of funds gathered from the report sales. These funds are shared in some proportions and part of them is send to the sales budget. This budget is decreased each day because of the costs of IT personnel and maintenance. We have not introduced in our model the cost of the sales department and we have not modeled the hire processes, especially in the sales department, what was in general a difficult topic closely related to the type of business modeled.

Another element which decreases the project budget is the cost of purchasing additional information databases to improve hit count rate, that issue has been mentioned earlier.

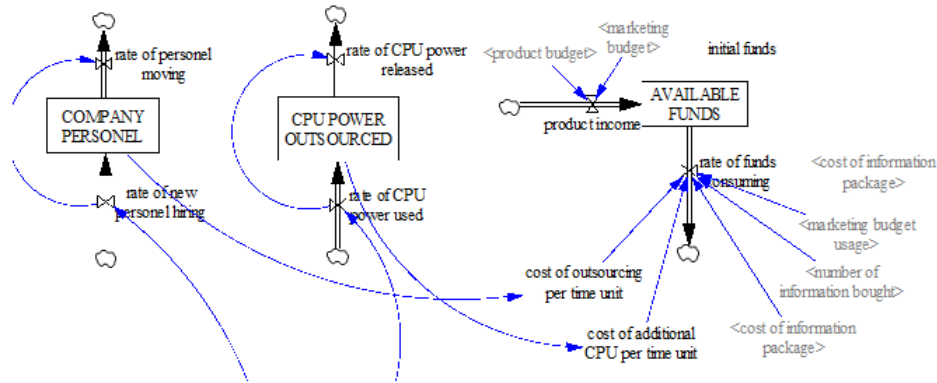


Fig. 6 Model of funds changes

3. SIMULATION RESULTS

We have simulated our model assuming a product life cycle equal to 400 business days from the moment of launching the product. We have assumed that there are additional databases that can be purchased with the fixed price for the pack of 1000 database records. We assumed that a company may buy additional information spending not more than 50% of its budget per each simulation step. We have also assumed that a quality of a opponent product increases linearly and a quality range increases from 0.5 to 1.0. We have not constrained the human and server resources in the computer cloud to retain a model flexibility.

Below the simulation results are shown in the case where a company can use additional information bought at a market to improve its product attractiveness.

In Fig.7 the simulation results are shown for a set of the potential clients. One can spot that the number of the clients purchasing product decrease during a product life cycle what is a broadly known feature of IT market. The number of the potential clients is distinctly higher than the number of the purchasing orders.

In Fig. 8 the final results of the report sales are shown in each simulation step (each day). A change in a volume of the reports sales is shown too. One could expect that during a product life cycle an attractiveness of the product decreases what is reflected in a daily sales volume.

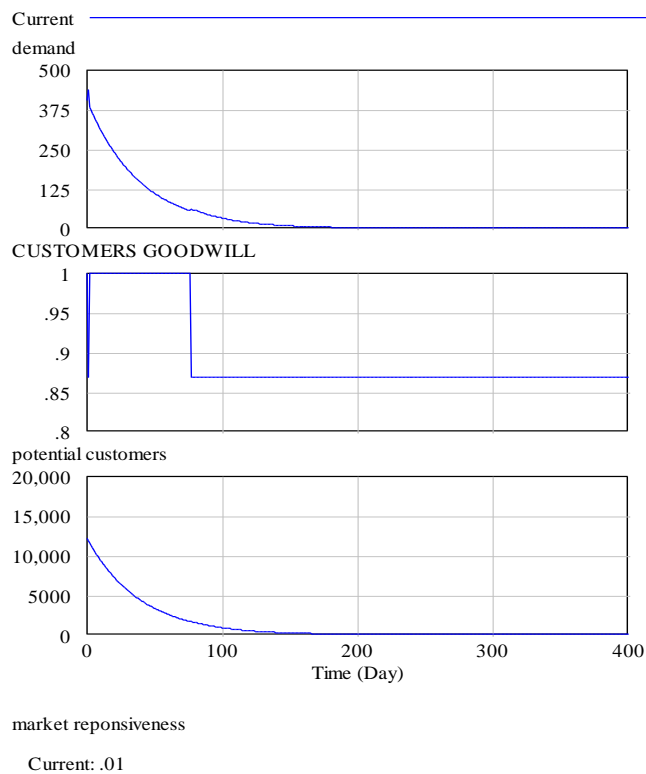


Fig. 7 Changes of the potential number of clients

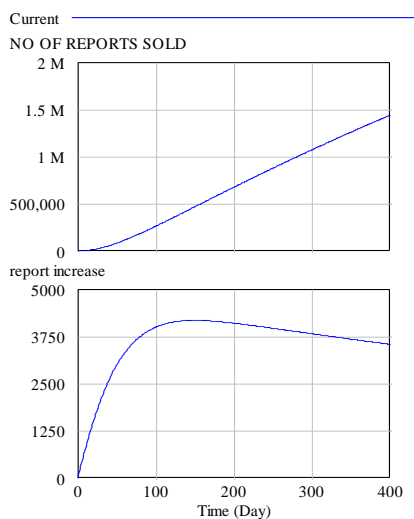


Fig. 8 The number of the sold reports and the change in report sales per day

In Fig.9 the change of a product budget and product income during a product life cycle is presented. Producer income operates at a stable level from the 100 product life cycle day since the product launch. It is a common market result for an IT product.

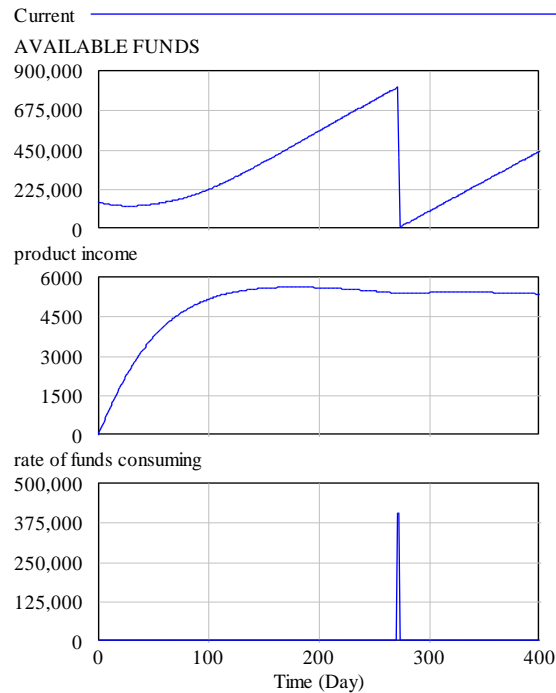


Fig. 9 Change of a product budget and product income during a product life cycle

One should regard that the most important are usually the first three months when the product starts its existence at the market. One may spot a decrease of income for a short time. It is time when additional databases were bought because the product quality was lower than an opponent product quality.

3. CONCLUSION

In our paper we have presented a dynamic model of a product launching into the IT market. We have assumed that a producer uses an outsourcing services of other companies supporting the producer. Outsourcing services simplify product management and minimize the costs of product maintenance with a high level of SLA parameters. One may be sure that in a few years the outsourcing services management and cloud computing services will be a standard in IT sector. Our model is di-

fferent from others because we have decided to use only the parameters that can be easily calculated in a business environment in which the product will be sold.

We have presented the simulation results of the models of a product launching and have described different launching variants. The methods of assessing the outer IT databases used by the producer have been also depicted in the paper. These databases increase the product quality. Using System Dynamics approach to simulate the process of product launching helps to choose a proper strategy of product launching and in a final effect reduces the costs of these tasks. The simulation model has decision rules with given parameters. In the subsequent paper we will show how to obtain optimal strategies by solving optimal control problems.

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BIOGRAPHICAL NOTES

Wojciech Stecz is an assistant professor at the Faculty of Cybernetics at Military University of Technology in Warsaw. He obtained his PhD at MUT in 2004 in the subject of information systems. Between 1997 and 1999 he was working at Institute of Command Systems Automation at MUT. From 2000 up to now he has been working as an assistant professor at Faculty of Cybernetics. He is an author of several articles in the scope of optimization of the business processes in industry and logistics. He has been working as an ERP and the business processes consultant in industry and finance.

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