THE ROLE OF REENGINEERING IN THE MANAGEMENT OF NEW TECHNOLOGIES AND INNOVATIONS – 'PROCESS RESEARCH AND DEVELOPMENT OF NEW PRODUCTS' CASE STUDY

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Abstract: The study describes the significance of implementation of the business processes' reengineering in a modern business, its role in a new technology and innovations management, with emphasis on the case study 'process of research and development of new products' and implementation of this management technique in manufacturing processes in small and medium -sized companies. The purpose of the study is to highlight the significance of reengineering implementation and its significance for fast development of a new technical paradigm, speed-up of technological development of the company, state and the society itself, improvement of the working conditions, reducing costs, profit increase, all of which lead to alleviating keeping the place in the market. By this, the technique is once again put at the pedestal of the world interest for the new management techniques to improve business conditions. Furthermore, reengineering is also important as a management technique that could be used as an excellent cure for problems that occurred when it came to the economy crisis, mainly with the processes that must take modified and decreased demand of goods and service into consideration.
Keywords: reengineering, technological management, innovations, processes, economy crisis

1. INTRODUCTION

Business process reengineering is a management technique developed by the end of the 20th century, namely at the beginning of the 90's, and it deals with a study of redesigning of business process essentially, which means cancellation of the old processes and instead creating the completely new ones. In order to consider them a successful reengineering, such redesigned processes should provide exceptional savings or profit increase (over 50%).

On the other hand, it is necessary to find a way to use technological and innovation potentials for improvement of the company's functionality and development, as well as reaching, maintaining and developing of the competitive advantages of the economy subjects. Technological changes are one of the key forces influencing company's competitive advantages and are hard to respond to in due and duly way.

Nowadays, management has to be in a position to control both stable and changeable situations. Successful technology managers have to quickly recognize and respond to external changes. In a long run, technical-technological development is a key factor for clarifying basic characteristics of the social and economy development. Scientific-technological revolution is significantly penetrative and is dispersed into various areas by creating numerous new industrial and non-industrial branches and their segments, products and services, and by implementation of their achievements in already existing sectors and economy branches for the sake of modification and revitalization.

It created basis for a radical change and introduced the world to a new growth mode and civilization context that most of the authors call the creative, innovative society or the knowledge society. A new technological-economic paradigm (TEP) is based on the information intensity of processes, assets, material and products. Instead of mass and homogenous production, there is a small quantity, heterogeneous and flexible one that enables diversified response to market requirements. Also, the mere concept of the production is changed. We go from economy of the great production capacities and giant companies' management towards reducing of the production in big companies, starting from gigantic steel and car factories that reveal their weaknesses intensely with the appearance of new TEP elements, towards production increase in small and medium-sized factories that utilize conveniences of having in the vicinity the market, clients and easy communication with the suppliers.

From the economy of the size or volume, based on homogeneity, mass production of the same or similar products which leads to minimizing the production unit price, manufacturing process is directed towards the economy of variety, cost-effective volume based on the flexibility and diversity, with a tendency to reach high quality, standardization and maximum adaptation of basic characteristics of the product to the end user's needs

and the small quantity production. The most difficult innovation in transforming organizational structure in the new TEP, as well as in economy life, in general, is overcoming and abandoning of the old principles of running the business related to maximum stability, productivity and profitability in a short-term run. Instead of that, maximum flexibility and a quick response to the market and consumers' needs are considered to be the key features. The new competitive situation requires:

• Revision of the potentials and renovation of the manufacturing process from the aspect of the new technologies implementation;

• Introduction of the new management methods and techniques;

• Redefining the position and importance of the human capital;

• Restructuring of the business activity, organizational structure and development strategy of the company as a whole.

Based on the a/m, one may say that a new process reengineering as a new management technique is essential in order to approach the innovation implementation and fundamental redesigning of the business itself more successfully, so that it could be in accordance with the new technological-economical paradigm. [1.]

The purpose of this study is to explain the solutions brought by reengineering technique as one of the most efficient ways to adjust processes to new TEP requirements, through 'a process of sewing shoes' case study. Furthermore, it is important to mention that, during the problem examination, the new process planning and the realization itself, no existing methods were used, but the management has come to the individual, completely new process solution, in accordance with the problem, that should be used as a process innovation applicable not only to the process of research and development of new products [2.], but also to the many other manufacturing processes.

Reengineering is a fundamental rethinking and radical redesign of business processes in order to achieve dramatic improvements in critical, significant performance measures, such are costs, quality, service and speed. This definition has 4 key words:

• fundamental,

• radical,

• dramatic, and

• processes. [3.]

Main part in the philosophy of reengineering belongs to the processes and this term regards to the process design. Reengineering revolution had two main subjects: process organization and process organization in a more superior way.

The term reengineering is tightly connected to the need of the companies to reinvent themselves, namely a new business model to achieve re-inventiveness of the companies. [4.]

This case study of applying reengineering in business process, research and development of new products is a part of business experience and inventiveness of the company City manager. Research and development is a term for process projecting new products and handling market research in a way that it responds to new products or product lines.

An issue concerning survival on the market has been seriously intensified by market development, globalization and with a new world crisis. These tendencies brought market overheating. It was necessary to place as much model prototypes as is possible on the market, and that they have a low price. It was possible only with new research and development processes.

This process is time consuming, risky and very expensive. If it lasts for a longer time, there is a risk of missing the focus of demand and to fail to result in extremely good models. If there is any mistake while choosing the model, the effect of increased demand and extra profit would not be gained. If there is not enough attention given to the costs, they may be higher than the profit.

The purpose of reengineering and new product development is to drastically decrease the length of the process, to lower the risk of wrong choice and to minimize the costs in order for new products not to be over expensive in research and development.

Therefore it was necessary to abandon this way of product research and development and to come up with a process that will be shorter, cheaper and less risky.

Hypothesis, coming from studying changes in the market, globalization and other important influences put classical way of organization of research and development process into question. Change in consumers' behavior in the market, when he stops taking what was offered to him, but he has his own clear demands for certain products, has stopped the age of mass production and brought the age of

production for previously determined consumer, with clear demands, which includes smaller series of products with changeable contents. Besides that, market is becoming overheated and it loses the demand, which complicates an already difficult situation. Lifespan of one product line is decreased and that puts pressure on manufacturers who must invest in development of new fashion lines. It is necessary to radically change product lines so that they become more efficient with smaller series, easily adjustable to consumers' wishes, and faster, more efficient and a way cheaper. Business terms in the world change. There are no more rules of mass production. This principle has become inefficient.

Nowadays, a manufacturer cannot count on mass production, but on the production for a familiar consumer. It means he has to fulfill the consumers' wishes, his specific requests, and all that include cost increase, smaller series, bigger variety in supply.

A special importance for understanding the necessity of investing in new products is in the fact that someone who does not invest in new products or services cannot count on success. It is also necessary to highlight that the most expensive way is to create completely new products, new features of the products, fashion lines, etc. companies that create these new products independently, spend a large amount of money on research and development, but they are in a position to place the completely new products on the market and thus take extra profit and special position. On the other hand, there are far more organizations that conduct research with lesser risk. These research processes require lower costs because they do not need too many resources for studying new prototypes.

Thus, the problem lies in the choice of future product models that will have the power of the best selling products. This problem is the hardest to solve because it relies on statistics that is not easy to calculate. It is necessary to calculate on time what the potential consumers think about new fashion lines.

Firstly, it is necessary to analyze the process and to determine what elements will be expensive and slow, and then to change these positions. The following has been concluded:

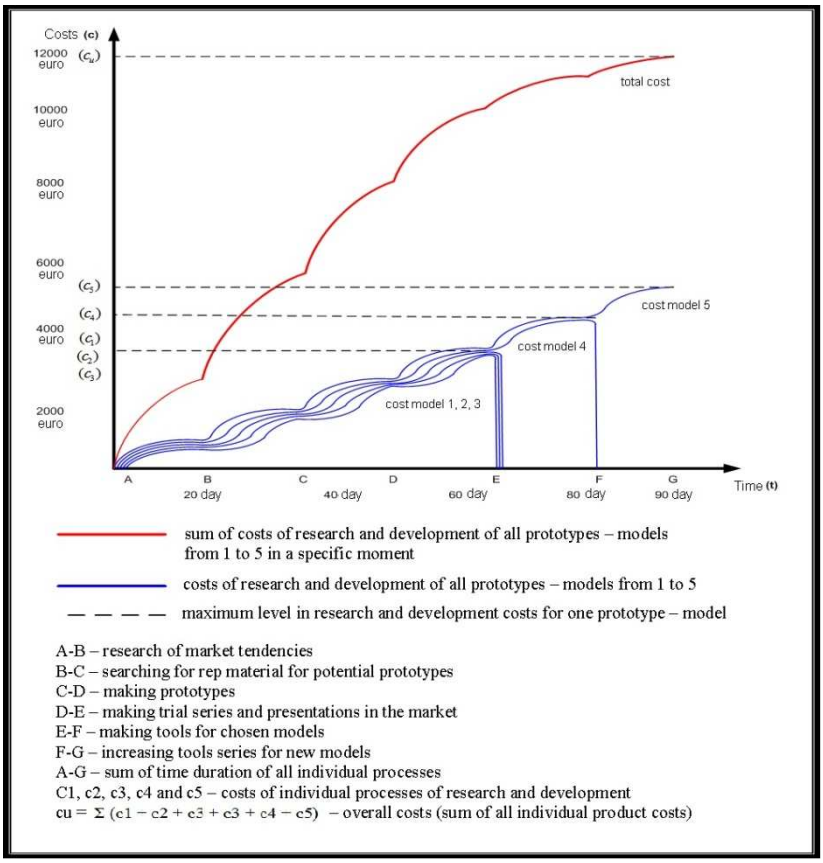

Figure 1. Review of overall costs in the old research process and new product development

No matter how high the costs of research and development may be, only a small number of chosen products presented to potential buyers succeeded in satisfying their taste. There were also cases when buyers believed and bought new products without thinking, but these products were not required anymore in the future. This is very risky for a business because it represents also the loss of trust built over the years. The purpose was to satisfy wholesale buyers with the products and not to earn

money on built trust for a short time. Thus the task was to attract more new buyers and to give them the pleasure of cooperation that will lead to new purchasing. Therefore, it was necessary to introduce reengineering of research and development process.

The first idea was to search the market not with models, but with concepts. Tastes are different, but we must measure them. Practice showed that if there are 20 new models in the market, only 6 or 7 are interesting to buyers, and when it actually comes to the shopping, only 2 or 3 are going to be bought. That means that, in order to attract the attention of buyers, you have produced 20 models, made 20 concepts that can be examined and put on. The idea was to minimize the number of wasted models that required material, energy and time for realization. This was divided into 2 following phases.

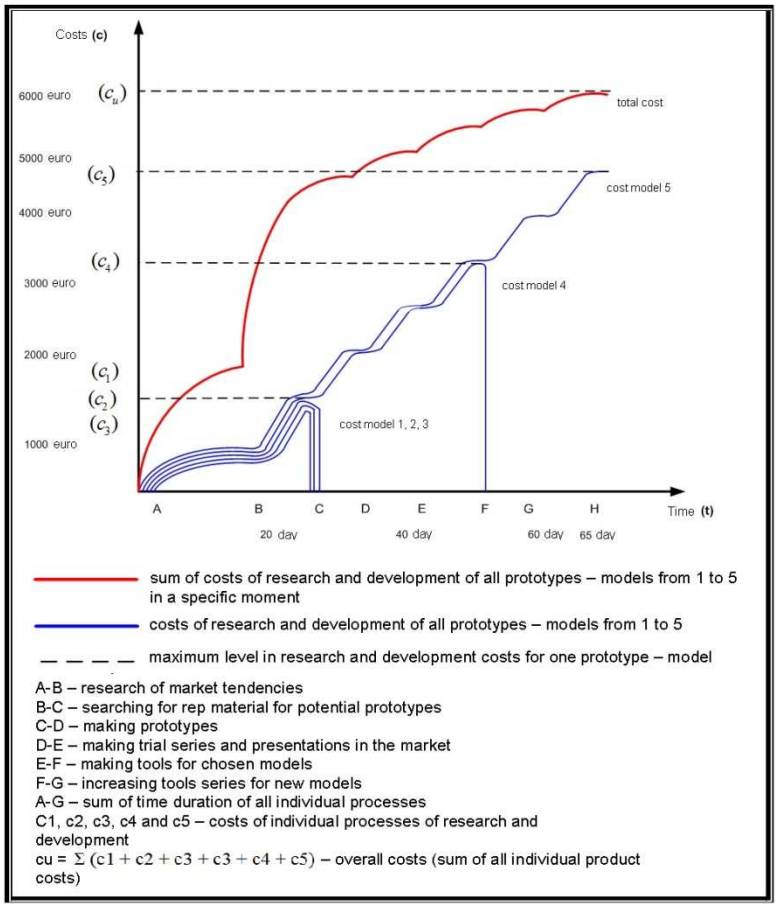

Figure 2. Review of overall costs in the new research process and new product development

At first, the number of tools for models was minimized, reducing a model tone number, e.g.42 for men and 38 for women. That saved the money. Next year it was continued. There was a question why there is no presentation of model concept in preliminary drawings for buyers. That way feedback information could be gained from the market before investing n new models. After questioning potential buyers, information about the most wanted models were gained.

What did we get from modification in research and development of new products, after introducing pre-research based on new product concept?

• Number of rejected models from 75% to less than 20%

• Less rejected models resulted in minimizing the costs 2 times for creating trial models

• New offer to buyers was received 2 to 3 weeks earlier which led to timely preparation for a response from the market to the new offer.

Market preliminary research was introduced, so all the models that would be unsuccessful in the market were rejected. On the one side, this increased the costs and research time, but, on the other, it saved the money because there were no more investments of uninteresting product models. There are fewer models in the market now, but with better effects, because now the market accepts more than before.

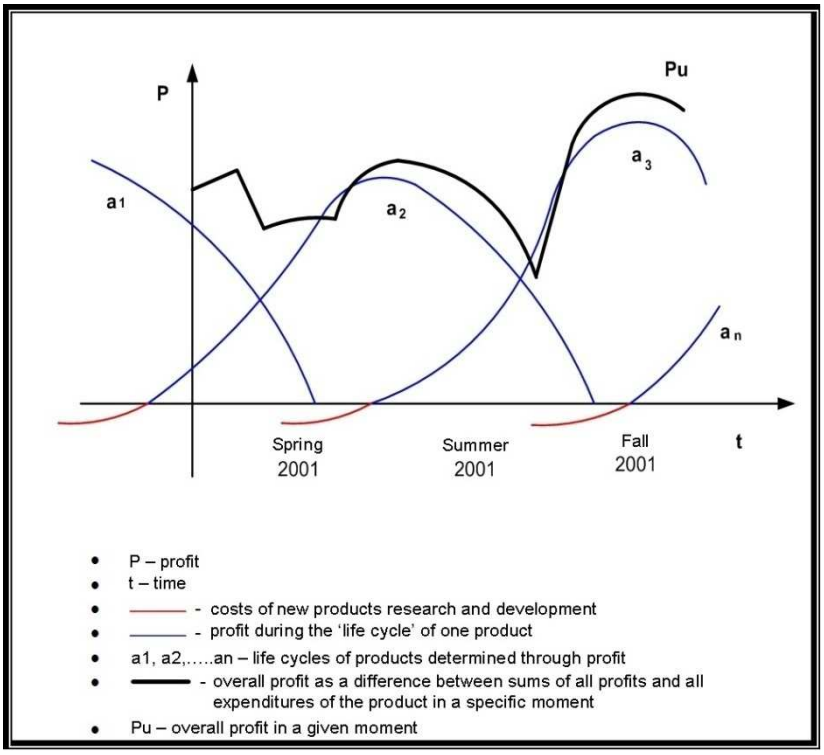

Figure 3. Review of profits in the old research and development process

What did we get by applying new product research and development process, after introducing pre-research based on new product concept?

• Number of rejected models was reduced from 80% to less than 20%, and 60% of models was rejected immediately after preliminary examination, and only 20% after presentation of finished models in the market;

• Less rejected models resulted in the costs for creating trial models minimized two times. Images 1 and 2 show that the costs after reengineering slowly grew because there are fewer prototypes and models are part of them. This saving is gained in time period from B to E as shown in Image 1. As it can be seen, there are all 5 prototypes in the development. Development of each prototype requires big costs and a significant time period. Minimizing the costs is a result of reducing prototypes that are part of the further development (Image 2, time period from C to F). In that development time period, only 2 prototypes are taken, and that results in overall reducing of research and development costs. Thus, research and development costs of the prototypes that are not likely to be bought are almost eliminated;

• Furthermore, offer was done 3 to 4 weeks later. Only time periods from A to B, Image 1, and from A to C, Image 2, were simultaneous for all models, and in the later stages of research and development there was a significant moving in time between 2 models, which resulted in great time saving in overall research and development of all models. Images 1 and 2 show that reengineering brought to speed up of the process and that led to earlier appearance of the models on the market;

• One of the best benefits is in the fact that market was offered less number of models that do not bring extra profit. Thus the reliability of demand was kept because the expectations of the regular costumers are fulfilled. It is necessary to highlight this benefit because it is more important to keep the regular costumers than to compensate the loss of them by the new ones. New costumers rarely opt for big and regular shopping until they are sure that their choice of a new supplier is more beneficial than established supply channels;

• Finally, by finalizing earlier research and development in one season, there is enough time for saved resources to be used in product development next season or semi season. Thus, product range is expanded with the missing products.

Images 1 and 2 show simple review of new product research and development which describes the relations between number of concepts, prototypes, models and new products in the best way. Also the ratio between anticipation (prototypes), offer (models) and end product (new product) can be shown.

Image 3 shows the movement of profit in the old research and development process. Red lines

indicate the costs of research and development of new processes and their relation to time they appear. Profit line is broken and it signifies frequent falls. Research and development costs are big, and research is time consuming.

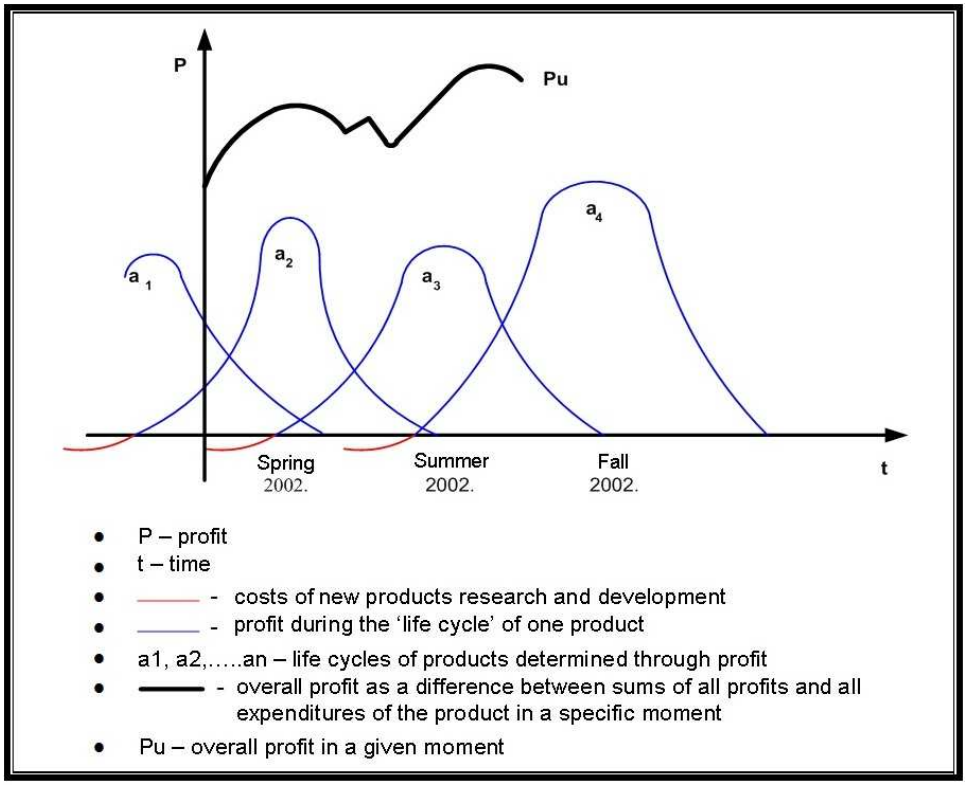

Figure 4. Review of movement after reengineering of research and development process

Image 4 shows movement of profit after reengineering of research and development process for new products. There is a difference because processes are more frequent now, they last shorter, and they require less money. Research and development costs, marked with red line, are minimized (close to zero line). It shows that a new research and development process shortens the time of successful showing up on the market, and, at the same time, it minimizes the costs for project realization. This results in profit line that is less broken, has less falls and shows bigger average amounts.

The second significant result is that chosen products are in the market few weeks earlier and that provides a chance for their better placement. There is a bigger success because if the products are a bit late, they cannot take over a respective part of the market already taken over by the competitors.

Table 1. Review of improvement of parameters after research and development reengineering

Reducing of time for set of processes	**30%**
Reducing of research and development costs	50%
Reducing of number of machines or tools used in processes	50%
Increasing of process profitability	20%

Table 1 shows improvement in the following parameters. As a reference for start, a year before the reengineering is taken, so the percentage is 100%.

2. CONCLUSIONS

The conclusion is that, by the business process reengineering, namely research and development process, there is a significant saving, because the costs for creating prototypes are reduced. Furthermore, speed up of the process resulted in earlier coming of products on the market, and that increased their chance for realization and taking over of the market place. Also, the key success includes more stable profit that was a result of better and more predictable business conduct.

Thus, the hypothesis that for the modern business, it is necessary to be adjusted to by improving reengineering for better results was confirmed. As the market is overcrowded due to offers that change and get bigger, as well as due to great influence of new economy crisis, it is necessary to make changes in research and development processes first, because

there is a constant demand for new products. Also, if there is no change in new products research and development processes, there is a risk of placing new products too late. In new conditions of economy crisis, more efficient yet lower costs of research and development provide both better position in the market and a key advantage in reducing production costs.

The main conclusion is that reengineering of business processes is an insufficiently researched technique that is nowadays helpful in order to adjust the processes to new economy challenges such is the current economy crisis and new technological-economic paradigms as well.

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