

INCREASING OF ECO-EFFICIENCY IN FOOD INDUSTRY BY PROCESSES REENGINEERING

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Abstract: Contemporary, dynamic and global world created a series of modern challenges for economics and management of the food industry enterprises. The relationship between aspiration for bigger and faster profits, values of the subject, usefulness and safety of the food products becomes more dynamic. The balance in world economics is already broken and it is not in interests in food quality and safety, community and environment. In such a situation, with exceptionally high business organizations, burden is the application of processes reengineering. It is because the subject values are redefined by the models, systems and instruments of reengineering methodology. The focus of company activities is directed towards the community and environment benefits for solving the environmental problems related to food industry.

Keywords: food industry, eco-efficiency, management, reengineering, sustainability

Introduction

What decision to take the creative entrepreneur in the food industry now is converted to a main question? The investigations reveal that the choice is directly related to processes reengineering. The complex reengineering of business organizations holds out to entrepreneurs and managers four possible action fields – competition, value innovation, divergence and convergence [4]. Characteristics and potential of every one of these fields are shown in many previous researches [4, 5, 6].

Processing industry, including food processing, plays prominent part of Bulgarian economy. Increasing of production rates leads to strengthening of harmful environmental impact. Ecological problems of food industry are related to generation of specific and various wastewaters, big quantity of organic wastes, great raw materials, water and energy resources consumption, using of various packing materials and generation of packing wastes [8, 10].

The idea of eco-efficiency is relevant to production of food and services by the use of minimum natural resources with minimum environmental impacts (e.g. creating more with less). This is one practical and systematic approach which the business can adapt to its action in order to increase benefits for the environment and for the business organizations. Applying of eco-efficiency conception and methods for its assessment is relevant to sustainable development of society. There are many assessment approaches for evaluation of eco-efficiency described in the literature [2]. However, the uniform approach is missing. This is because of two reasons. The first one concerns the environmental requirements which are set on the input and are in any case more or less populist and/or contradictive to the subject's values. The second reason includes data which are used on the output but concern mostly economic values for the production instead of benefits for the environment and society as a whole. According to complex reengineering concept eco-efficiency of the production is a function of values for the society, environment and business organizations and also the values as a result from strategic eco-orientation, integration of environmental

effects, and investments for realization of definite production scenario of separate or complex environmental activities. In conformity with the reengineering philosophy efficiency of the separate environmental activity has to be measured by degree of increasing of incomes and values for the environment and society received from production eco-intervention divided to costs of this intervention [5].

The European Eco-efficiency Initiative and initiative of the World Business Council for Sustainable Development in collaboration with European Commission set the goal for integration of eco-efficiency to European business and to industrial economic policies of the EU. In 2011 has been introduced the resource-efficient Europe – Flagship initiative under the Europe 2020 Strategy.

The necessity of entire binding of environmental and economic thinking in the separate companies including from the food industry is clearly outlined in order to passing to greater energy and resources efficiency. In this relation on the base of concept “4E” (Equity, Efficiency, Environment, Ethics) eco-efficiency model for corporative management of Bulgarian business organizations is developed. This model includes implementation of value system, system for resource planning, sustainable and balancing system of indicators for efficiency assessment, codex of corporative sustainability, reengineering of strategy and making of “4E” decisions [1].

The idea for processes reengineering as a tool for realization of great benefits for the business and for the environment is developed with exceptionally intensive rates during the last ten years. It is considered that this approach is not useful for the companies which want only 10 % of growth but for these which strive for ten times more growth. There are different methodologies for reengineering of business processes reported in the literature. In 1999 consolidated methodology was presented which can be applied successfully from the business [9]. During the period from 1996 to 2012 in Bulgaria have been published a lots of researches related to reengineering approach. It starts to reveal the interdependence between the processes of strategic orientation, efficiency of the strategic management, internationalization, management of the innovations and of the risk and eco-efficiency [4, 5, 6].

All mentioned above show the necessity of reorganization and restructuring of the business processes in the food industry starting from the input flows across basic production processes and finally to distribution and marketing of the food product.

The main goal of this study is investigation of the possibilities for application of the processes reengineering concept in the food industry enterprises in order to increase their eco-efficiency.

Framework model for reengineering in the food industry

Relation of indexes “industrialization-environment” requires solution of series of problems connected with environmental management of enterprises. First of all these are the problems related to values and values program of the subject. Food production is developed in the frame of three main indexes: value system of the subject, striving for bigger and faster profits and food usefulness and safety. According to complex reengineering the point of intersection of inventories and the situation as combination of energy and information defines strategic orientation of each of these activities and variants in the space of business and consumption. Interaction of these activities and variants of business forms the image of the contemporary market economy in the food industry, which defines variety of relationships, interests, goods and food products. This interaction is

unthinkable without reengineering of the ecology in food industry by which more persistently is searched for answers of the following questions: What is the role of energetic for eco-efficiency in the food industry? Which are the sources and possibilities for energy production and what is the correlation between energy supply and demand? To whom, what type is the energy and how to produce it? How to ensure healthy and safety food? Which are the basic sources of environmental pollution? What are the reasons for environmental pollution, mainly by organic substances and solid particles? Which are the problems of the environmental management of global chain for supply and demand of food products?

According to data from Bulgarian National Statistics Institute part of mining and processing industries towards the total gross domestic product for 2011 is 21,2 % and part of the food industry is 2,6 %. Part of generated food processing wastewaters towards total industrial wastewaters is 10,73 % and towards total discharged wastewaters for the country is 3,99 %. Generated solid wastes from the food industry towards total wastes is 0,17 %. In the same time total emissions of industrial toxic substances are about 4016284 t, from which 88,7 % are CO₂ emissions. Energy consumption for receiving of raw materials in Bulgarian food industry per unit product is about 1,8 times more than in Turkey and Greece and about 1,5 times more than the average consumption in EU [3]. The main reasons for it are disunion of agricultural massif and farms, high fuel consumption because of old and non-effective equipment used, non-effective logistics, bad infrastructure and non-effective management. All of these data show that the basic ecological problems of food industry in Bulgaria are energy consumption, generation and discharging of wastewaters. The next are generation of solid wastes, fresh water consumption and etc.

Our investigations show that wastewaters from different branches of the food industry in Bulgaria are polluted mainly by different organic substances and suspended solids. In table 1 are presented average results for the basic indexes which define degree of wastewater pollution from some food industry enterprises. The obtained data are in accordance with results published before [10].

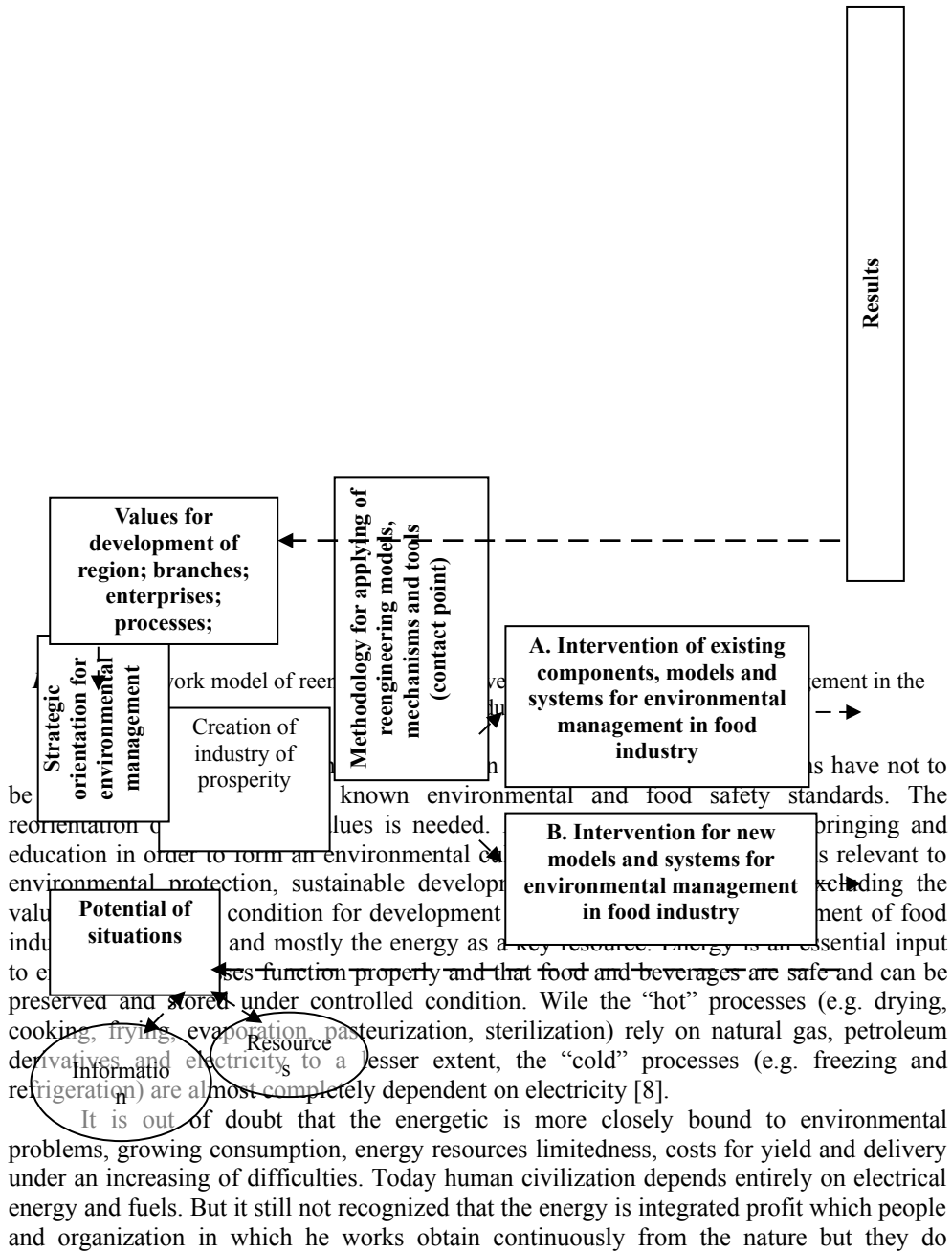
According to methodology of reengineering the fragmental approach for improving of environmental management in food industry is non-effective. It is necessary to apply a complex approach where the environmental management is the basic factor for development of food industry. That's why we recommend the use of the complex reengineering model, shown on figure 1. This model ensures that it is necessary to work on the values and values program of the subjects. It is because if some defects have arose in the value orientation of the subject related to realization of benefits for the society and for the environment the following question will be asked: How will be produced the necessary usefulness and safety food and beverages?

Table 1. Characteristics of wastewaters discharged from some industrial food enterprises

Index	Type of enterprise				Standard, mg/dm ³
	Cannery	Slaughterhouse	Meat processing	Milk processing	
COD, mg/dm ³	154.8	354.8	108.0	602.3	70
BOD ₅ , mg/dm ³	67.8	134.6	28.3	312.5	15
SS, mg/dm ³	30.0	90.8	37.0	182.2	50

FOG, mg/dm ³	8.0	4.5	8.0	10.6	3
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COD – chemical oxygen demand; BOD₅ – biological oxygen demand for 5 days; SS – suspended solids; FOG – fats, oils and greases.



nothing for its increasing. Combustion of classic energy sources (coals, petroleum and natural gas) emitted more than 20 milliard tones per year CO₂ into the atmosphere which is the reason for greenhouse effect and for global warming. According to some authors [5, 6], toward 1990 in Russia are used up energy resources per unit revenue 11 times more than in Japan, 7,5 times more than in Germany, 6 times more than in Great Britain and 4 times more than in USA. Moreover, it is known that the natural resources usage for productive activities is not efficient. For instance, in U.S. economy, only 7 % of natural resource extracted becomes product. Out of 7 %, only 1 % becomes durable and 6 % will become waste in the first use by customers. In addition, by considering these 1 % of durable materials, only 0,02 % of them are recycled [7]. World food providing and development of food industry provoke increasing of the energy demand while energy production by classic methods is limited. This reveals the most serious problem of the global “supply-demand” chain of energy. Really, increasing the energy price is irreversible and the main load is for consumers by purchasing of food. The rate of incomes growth per household is about 2 times less than the rate of price growth of qualitative and safety food. In order to exist solvent demand manufacturers often produce food with additives which are not nutritive for the humans. This compromise in food production leads to move away from the natural lifestyle and creates problems through the entire food chain. In such a situation one of the ways is production of “green” energy and searching for the possibilities of limiting and saving of energy throughout the global food chain. Undoubtedly, reengineering of the business processes concerning wind and solar energy, remanufacturing and recycling of the wastes in food industry will be the flavour of the next 10 years. It will ensure optimal and effective environmental management of business organizations. The interaction between human and nature will be improved too and the risk of environmental pollution will decrease significantly.

Our study reveals that the energy consumption and energy factors are the keys for movement of two main flows in human civilization: market needs and business needs. These are decisive for the complex index for influence on the consumption rate of food products and services (CPS). That’s why we recommend the next formula and scheme (fig. 2) for reengineering expert in food industry.

$$CPS = \sum_{i=1}^n V_i \cdot I_i \cdot E_i \quad (1)$$

where: V_i – key factors of values for the subject;

I_i – key information and technological factors for the business;

E_i – key energy factors for business in food industry.

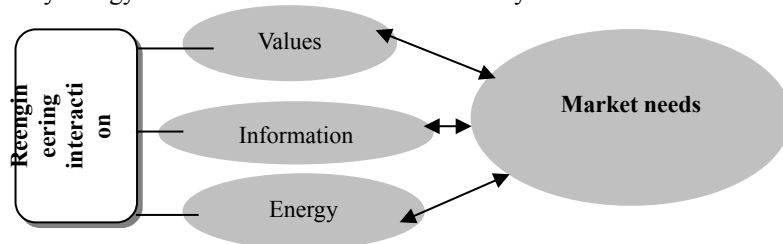


Fig. 2. Scheme for processes reengineering in food industry

In a short-time with the highest load for the business in food industry will be the consequences from energy factors impact and the organization of reengineering.

Conclusion

It is recognized that eco-efficiency in food industry is about inputs (materials and energy) and outputs (product, wastes, emissions) characterizing a production process and whole life-cycle of product. By optimizing these characteristics considerable reductions can be achieved in environmental impacts and costs. It is clear that in order to reach creative development of food industry have to be used reengineering technologies for “green” energy, optimizing the processes, improving of wastewater management, utilization of wastes, reusing and recycling, introducing of eco-efficiency indicators and implementation of environmental management standards such as series of ISO 14000, GS1, ISO 27001 and etc. This study is presenting a suitable model for business processes reengineering in food industry.

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