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Model for implementing a reengineering solution of the production process in a printing house

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Abstract

The main objective of the present paper is to highlight the importance and impact of the concept of reengineering, both by identifying certain opportunities to improve the performance of Romanian printing companies and some strategies of total redesign of the production process based on highlighting some of their effective combinations as well as the integration of some proper mathematical models. First of all, this study will focus on achieving results that are based on identifying some specific problems that companies have faced at a certain point and on concrete problem solving solutions. Second, there should be emphasized that reengineering works in almost any situation related to a big or small company or the production area or NGOs. Specific objectives: designing and testing a mathematical model that can be adapted to the specific activities of the printing organization, providing the best solution of variable allocation to increase performance.

1 Reengineering and its impact upon romanian economic development

Many important companies have made considerable efforts to offer to the customers an adequate response and the expected value using reengineering, respectively by "orienting the business processes according to the customer and

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using information technology in order to obtain an advantage" [Manganelli R.L., 1993]. Starting from this data, Michael Hammer starts the concept of "REENGINEERING" in the article "Reengineering work: Don't Automate, Obliterate" [Hammer M., 1990]. It is obvious that any theoretical approach of reengineering must start from its first definition, almost unanimously accepted even today, almost nine decades since this was launched by Michael Hammer and James Champy: "Reengineering means the **fundamental** rethinking and **radical** redesign of a business **process** to achieve **dramatic** improvements in critical measures of performance such as cost, service, and speed." [Hammer M., Champy J., 1993, p.117].

Thus, we can emphasize a series of reasons that support the reengineering of the business processes. One of the most important ones is a spectacular growth, highlighted both the increase of the incomes as well as by the demands of the customers. During the last decades, in the economically developed countries, both the gross domestic product as well as the real income of the population has continuously increased. The population is oriented towards buying various goods, personalized to its need. The literature describes this transformation of the customer's preferences using a series of terms and specific strategies regarding the products and the related markets: the flexible specialization [Piore M.J., Sabel C.F., 1984], the neo-industrialization [Kern H., Schumann M., 1984], the transition from the mass production to the mass personalization or post-Fordism [Womack J.P., s.a., 1990]. The necessity to turn to reengineering results from the manner in which a "traditional" enterprise works and the way in which it is influenced by the contemporary turbulent environment [Hammer M., Champy J., 1993].

The main objective of the present paper is to highlight the importance and impact of the concept of reengineering, both by identifying certain opportunities to improve the performance of Romanian printing companies and some strategies of total redesign of the production process based on highlighting some of their effective combinations as well as the integration of some proper information technologies.

First of all, this study will focus on achieving results that are based on identifying some specific problems that companies have faced at a certain point and on concrete problem solving solutions. Second, there should be emphasized that reengineering works in almost any situation related to a big or small company or the production area or NGOs. Well-defined processes are regarded as the key for any organization that intends to adjust to the current business environment which is governed by an increasingly strong competition.

Specific objectives:

- setting a new approach to the role of managers within the business and the tools required to implement the methodology specific to the concept of reengineering in their work;
- setting multiple development directions of fundamental research stages of the reengineering concept by using modern methods of investigations and applying state-of-the art methods, techniques and procedures;
- presenting concrete methods as a result of a thorough knowledge of the printing process and making suggestions for rational organization and efficient running of organizations in this particular sector;
- designing and testing a mathematical model that can be adapted to the specific activities of the printing organization, providing the best solution of variable allocation to increase performance.

2 Reengineering methodology

Research methodology included techniques and research tools, such as analysis, comparison, application software, case study as well as selective market research methods. In order to identify opportunities for applying the concept of reengineering in the Romania printing organizations, all three types of research were used: exploratory, descriptive and causal.

Exploratory research was used to identify the specificity of Romanian printing organizations. Thus we determined the methods used by managers of the analysed printing organizations can adapt organizational components in order to increase performance.

Due to the **descriptive research** of the main key performance indicators used in the printing industry, we managed to design a mathematical model which we applied to an organization in the view of quantifying its performance as a result of redesigning the production processes.

Due to the **causal research** we could identify the cause-effect relationships between the independent variables associated with quality and diversity increase of products and dependent variables associated with organizational performance increase. In order to highlight the evolutionary aspects within this field, we considered necessary to tackle the role that organizations play in the economy.

Scientific innovation of investigations lies in the following aspects:

- modelling the processes concerning the application of re-engineering principles within the printing organization via a mathematical model based on Pareto multi-criteria optimization and on an econophysics model, the model of economic amplifier, "economic transistor".

- printing process modelling using vector optimization shows the originality of interdisciplinary approach to the present research, which enables the discovery of new concepts of optimal resource distribution strategy.

Choice of research topic derives from the motivation to extend the limits imposed in the printing industry through elements, concepts and management models that can contribute positively to organizational development and evolution of a business in this field. The present paper aims at bringing forth a brief presentation of tendencies that have been displayed over the years in the printing industry, the evolution of management concepts and methods used in this rather restricted field and last but not least the approach to a mathematical model for implementation of reengineering solutions for production process in the printing house through a thorough analysis of the particular strategy. The topic of this research paper shows that it has a widespread applicability in the integrated system field of process re-engineering in printing organizations.

Currently, **the interdisciplinary character** of management research is amplified by the following tendencies:

- practical application in a systemic and interdisciplinary view of the basic principles of management research;

- defining management at microeconomic and micro-social level as a social and human science, which aims at expanding and enhancing research in this area in terms of cultural, managerial, social and economic organization tradition values;

- defining the scientific approach system to management organization, emphasizing at the same time the general theory of management;

- need to involve the scientific creation in learning the factors of real impact upon the concrete management actions;

- dynamic developing of managerial field by expanding its factual base.

The applied scientific research in reengineering is required by the current market economy. Applied economic research should be conducted continuously to be applied in practice and to determine the successful implementation of the re-engineering process models within organizations in the printing industry.

The preliminary elements that determine applied research take into consideration the following aspects:

- setting the mission and objectives of the applied economic research;
- studying the theoretical aspects of economics in general and of economic activity and process or challenges of some phenomena such as globalization, integration, financial and economic crises;
- ensuring the necessary financial resources for research to eliminate financial conditionality of fundamental economic research and the researcher's performance deterioration for a specific subject or a specific research topic.

Applied economic research on re-engineering can be achieved and applied so that the strict specialization of each component ensures an accurate long-term coverage of all fields of interest for the management of successful companies. Currently the research in this field is based on management functions of the micro- and macro-processes. The macro-process management functions are the following: identifying the process, structuring the process (e.g. in a process map) and defining the process' manager whereas the micro-process management functions are the description and control of individual processes.

The current research level in the field reveals a number of factors such as:

- design, implementation and continuous improvement of the quality management system within the organization;
- the necessity to make employees aware on the importance and need for applying the company's policy on quality;
- continuous improvement of products, technologies and processes within the organization to meet the customer's requirements at reasonable manufacturing costs;
- use of state-of-the-art methods and equipment required by the monitoring, measurement and inspection process within the quality management system;

- ensuring priority for preventive actions as opposed to corrective ones within activities that aim at providing the quality of products and processes;

- avoidance of non-compliance cases caused by manpower misconduct in promoting through manufacturing only comprehensive training products;

- promoting a pro-quality strategy within the organization as well as in its relationships with suppliers, customers and third parties, that ensures continuous and sustainable development.

3 Mathematical model regarding the implementation of a reengineering solution of the production process in a printing company

The necessity for scientific and technological progress and the ever growing competition between the small and medium enterprises (SME's) from the printing industry forces them to find new opportunities to expand the variety of goods and services as well as to increase the quality and to decrease their operational costs. One of the ways in which we can reach these goals is to use new equipments and to implement the new digital technologies. Thus, the entrepreneurs should find answers to the questions regarding the *investments* necessary for the purchasing of new production equipments, *purchasing moment* and implicitly, the possibility to implement such upgrades. Due to the duration and their operational cost, the conventional method to select the equipment of an enterprise part of the printing industry is not enough to offer the best choices to the SME's. Thus, the enterprise must identify the main answers to the following questions: "What kind of equipment?", "Which is the necessary investment?", "Which is the profitability rate?" Usually the selection of the equipments of the company represents an optimization issue with many criteria, while the alternative versions can be compared by the instrumentality of their technical and their total economic characteristics. The purpose of this model is to introduce new approaches for the preliminary determination of the necessary tools and equipments in the production areas of printing houses and publishing houses. This approach allows the application of reengineering in the production areas of the enterprises from the printing house industry. The method was checked under real conditions, confirming the fact that an exact solution to the problem regarding the purchase of new equipments greatly influences the efficiency of the enterprise. The reengineering of the business processes is a modern method for the management and the industrial management [Davenport T.H., Stoddard D.B., 1994]. The use of information technology, the approaches of the inter-disciplinary groups of specialists and modern managers have the goal to [Hammer M., Champy J., 2000]:

- Increase the successful launching probability on the market of the newly developed products;
- Decrease the production costs;
- Increase the efficiency of using materials, human and technical resources.

This approach offers the opportunity to apply the reengineering principles in the design of the production facility of the printing house. The issue can be defined by the preliminary determination of the equipments necessary for the printing house industry enterprises. In the applied technical solutions, for the different stages of the technological process in limitative conditions, like: maximum surface allowed, product quality characteristics, *maximum allowed production personnel, the working schedule of the printing machine,* the purpose is the one to determine a number of combinations of possible technical means, in which the technological process should happen with a minimum investment in tangible fixed resources and minimum production costs.

The determination of the characteristics:

- The problem is of "vector optimization (multiple criteria)" type. The choice is made on the basis of analyzing the competitive versions from the total number of technical and economical characteristics previously given. For the small and medium enterprises the most significant in this preliminary stage of determining the required tools and equipments are the "own costs" and the "required investment" characteristics. Based on that, the entrepreneur can determine the internal rate of the tangible fixed resources.
- The large number of technical solutions specific to the printing industry determines the large number of possible versions. The level of the problem is exponential and this represents the least favorable option [Davenport T.H., Stoddard D.B., 1994].
- By determining the best choice, the options in contradiction with the allowed area, defined by limitative conditions are eliminated. The most important limits for the printing industry SME's are: *the quality of the products, the existing production area, the available production personnel and the schedule of the production.*

- When we determine the best choice, we eliminate the situations for which two or more technical means cannot work together.

The optimization is a problem with a high degree of complexity that admits the existence of many goal functions. The problems in which many goal functions must be simultaneously optimized are called multi-criteria optimization problems (multi-objective optimization, vector optimization). Most times the optimum criteria are contradictory, significantly making harder to establish a problem solving technique of this type. A simple approach allows us to convert the criteria in a single objective function, and the problem resuming to a classical optimization problem with a single objective. Each criterion will contribute to this function with a pre-established proportion. The choosing of the proportions for the defining of an objective function has usually a subjective approach that would affect the final solution.

For an optimization problem with m criterion functions: $f, i = 1, 2, ..., m$ we define the criterion vector, the vector m - dimensional with the following form, having the functions $f_i, i = 1, 2, ..., m : F = (f_1........f_m)$ as its components. Denoting by Q the field of the function $F, F : Q \to R^m$, and Q represents the search space for the given problem. The main drawback of the multi-criteria optimization problems is the incompatibility of the different criteria and consequently the impossibility to compare the solutions. In the case of the *Paretooptimization* this difficulty is removed by defining an order relation (domination relation) on the set of solutions. A *non-dominant solution* or *optimum in Pareto way* can be intuitively defined by the following sentences:

- Is not a worse solution compared to the other solutions.
- It is the best solution compared to all the other solutions if we consider at least one criterion.

In order to define the domination solution in the set of solutions (the space Q) we must previously define a domination relation in the set of values of the vector function F (the R^m space).

Let us analyze the following multi-criteria optimization problem: $P : \{f_i(x) \to max, i = 1......m\}, x \in Q$. The values of the vector function F make up the set V, where: $V = \{v \in R^m | \exists x \in Q, v = F(x)\}$

Let us consider u and v two vectors belonging to the set V. We can state that the vector v dominates the vector u regarding the considered problem, if the following conditions are fulfilled: $u_i, i = 1, 2, ..., m; \exists j = 1, 2, ..., m : u_j < v_j$.

We can state that the value v of the function F is not dominant (Pareto-optimal) if there is no other value that dominates this one. The relation defined over the set V induces in the space Q a domination relation. We can state that the solution $x \in Q$ is not a dominant (Pareto-optimal solution) if there is no other solution that would generate a value of the function F that would dominate the $F(x)$ range. The optimal - Pareto solutions of the problem represent the Pareto front associated to the specific problem: $Q_P = \{x \in Q | F(X) - \text{non-dominant}\}$. The mathematical model in which we can define the problem has the following description: in order to find a solution $X = \{X_1^1; X_2^1 1; ; X_n^1; ...; X_N^1\}$ that solution is optimum for all the criteria *opt* $F(X) = \{f_K(X); k, ..., K\}$. The satisfying restrictions are: $f_m(X) < b_m, g_m(X) < b_m$

Which defines the admissible area S, where [Boiadjiev, I., Malakov, I., 1997] defined:

- $N =$ the number of particular functions meaning the extent of the general function;
- $I_n =$ alternative equipments and machinery to perform n operations;
- F(X) = the vector of the target functions, *own production* costs and the required *investments*;
- f(k) = the technical-economical feature (own production costs);
- g(k) = the technical-economical feature (the required investment);
- X = the possible types of the different machines and equipments from the production sector that could be bought.

It is assumed that the functions $f(k)$ and $g(k)$ are separable and they connect the technical-economical features of the possible types of the different machines and equipments from the production sector to the respective homonymous characteristics of the enterprise [Ivancev, D., Negler, G., 1996].

The approach of the reengineering suggested to be applied in the case of S.C. GRAPHOTEK EXPRES S.R.L. by defining the technical means necessary for the printing house enterprise. S.C. GRAPHOTEK EXPRES S.R.L. is a small company that has the activity of printing books, standardized forms, labels and advertising materials (posters, brochures, leaflets, catalogues, advertising calendars, etc). The necessity to improve its activity, to increase the quality of the services and the strong competition in this field requires finding new solutions to improve the assortments range and to update the technologies in use. In order to update with more efficient equipments, the management of the company has the sum of 600,000 Euro and it must choose between two types of equipments for the offset printing, A and B, for their installation there are available 80 specialists of a certain qualification and respectively 40 specialists of another qualification. The type A equipment has the maximum printing format of 35x52cm and the type B equipment has the maximum printing format of 50x70cm and each equipment has many printing groups. A type A printing group costs 40,000 Euro, and its installation requires 8 specialists from the first qualification and one specialists from the second qualification, and for a type B printing group there are necessary 60,000 Euro, one specialist from the first qualification and 5 specialists from the second qualification. Knowing that the type B equipment brings a saving of two and a half times compared to the type A equipment, the identified function reflects the optimum number of printing groups, of each type, that can be ordered, in such a way that the savings that these would bring to be as high as possible. Thus we can note with **x** and **y** the number of type A printing groups, respectively the number of type B printing groups that can be ordered and with **f** we can note the total savings that the type A and type B equipments can generate. Taking into account the restrictions of the problem we can write:

$$\begin{cases} 40000x + 60000y & \leq & 600000 \\ 8x + y & \leq & 80 \\ x + 5y & \leq & 40 \end{cases}$$

where $x \geq 0, y \geq 0$.

If we note with "a" the savings brought by one type A equipment, the maximizing function will be: $f(max) = ax + 2,5ay$. The graphical representation of the inequities lines is given by the following relations:

$$\begin{cases} (D1): 2x + 3y - 30 & = & 0 \text{ or } \frac{x}{15} + \frac{y}{10} - 1 = 0 \\ (D2): 8x + y - 80 & = & 0 \text{ or } \frac{x}{10} + \frac{y}{80} - 1 = 0 \\ (D3): x + 5y - 40 & = & 0 \text{ or } \frac{x}{40} + \frac{y}{8} - 1 = 0 \end{cases}$$

Thus the optimization function can be written as: $f(max) = ax + 2,5ay/ : 2,5a$

$$\frac{f}{2,5a} = \frac{ax}{2,5a} + \frac{2,5ay}{2,5a} = \frac{x}{2,5} + y = \frac{2}{5}x + y.$$

We note $\frac{f}{2,5a} = t \Rightarrow t = \frac{2}{5}x + y \Rightarrow y = -\frac{2}{5}x + t.$

The graphical representation of the (D0) line is given by the relation: $y = -\frac{2}{5}x$

We draw the line (D0), (D1), (D2), (D3):

$$(D0): \; y = -\frac{2}{5}x$$

$$x = 0 \Rightarrow y = 0$$

$$x = 1 \Rightarrow y = -\frac{2}{5}$$

$$x = 5 \Rightarrow y = -2$$

$$(D1): \; 2x + 3y - 30 = 0$$

$$\begin{matrix} x = 0 \Rightarrow y = 10 \\ x = 15 \Rightarrow y = 0 \end{matrix} \Rightarrow \begin{matrix} A\,(0,10) \\ B\,(15,0) \end{matrix}$$

$$(D2): \; 8x + y - 80 = 0$$

$$\begin{matrix} x = 0 \Rightarrow y = 80 \\ x = 10 \Rightarrow y = 0 \end{matrix} \Rightarrow \begin{matrix} C\,(0,80) \\ D\,(10,0) \end{matrix}$$

$$(D3): \; x + 5y - 40 = 0$$

$$\begin{matrix} x = 0 \Rightarrow y = 8 \\ x = 40 \Rightarrow y = 0 \end{matrix} \Rightarrow \begin{matrix} E\,(0,8) \\ F\,(40,0) \end{matrix}$$

We intersect the lines $(D1)\bigcap(D2) = \{B\}, (D1)\bigcap(D3) = \{C\}$. We can Determine the B and C coordinates by solving the system:

$$B \begin{cases} 2x + 3y = 30 \\ 8x + y = 80 \end{cases} \qquad B\left(\frac{105}{11}, \frac{40}{11}\right)$$

$$C \begin{cases} 2x + 3y = 30 \\ x + 5y = 40 \end{cases} \qquad C\left(\frac{30}{7}, \frac{50}{7}\right)$$

The function f is maximum for all the points from the segment BC (figure no.1). Thus we have: $2x + 3y = 30$ or $x + 1,5y = 15$. Taking into account the coordinates of B and C that were previously determined and the fact that x and y must be integers, then y can have 4 values, knowing that between $\frac{40}{11}$ and $\frac{50}{7}$ there are only four integers.

$$(BC) : 2x + 3y = 30; (y) : 4, 5, 6, 7.$$

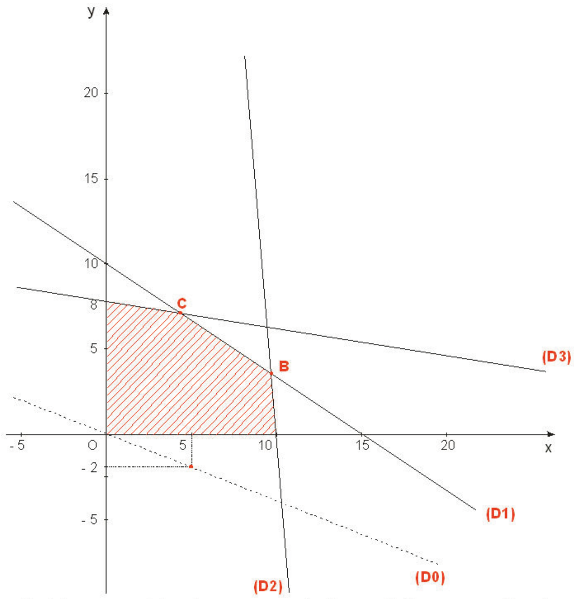

Figure no.1. The graphical representation of the coordinates B and C

The problem has two solutions: x= 9 ; y = 4 or x = 6; y = 6 which offers two possible configurations regarding the equipments that can be purchased. Between the two solutions we can make a choice taking into account mainly the purchase and the installation costs. Also, the first limiting factor is represented by the size of the equipments and subsequently the space allocated to these equipments within the production facility. The second limiting factor takes also into account the number and the skill of the employed personnel. As a result of the changes within the production process of the printing house enterprise, the quality of the produced goods has increased, in the same time also reducing the own production costs. The presented method supports the preliminary evaluation of the technical resources when the enterprises design a printing basis. This approach allows us to answer, in the initial phase of the project, the questions regarding the necessary investments and also gives us an estimate of the future production capability. The trial period of this approach in a real situation gives us the possibility to evaluate its applicability. Presuming $f : R^n \to R^r, f(x) = (f_1(x),, f_r(x))$ we are searching for x^* that satisfies:

- The unequal type restrictions: $g_i(x^*) \geq 0, i = 1..p$
- The equal type restrictions: $h_i(x^*) = 0, i = 1..q$
- Optimizes (maximizes or minimizes each criterion)

The chosen criteria are contradictory, *the quality of the products* and *the costs of the investment*: the better the quality of the product, the higher the purchase costs of the equipments. If we take into account the most significant characteristics during this preliminary stage of determining the necessary tools and equipments, that is "*operational costs*" and "*the necessary investment*", than $r = 2$ and $f_1(x) = x^2, f_2(x) = (x-3)^2$ for x in [-3,5]. It is desirable the minimizing of both functions. But there is no x* that can simultaneously minimize the two functions, so we are looking for compromise solutions good enough from the perspective of both criteria: x in [0,2] - there is not an x' with $f_1(x') < f_1(x)$ and $f_2(x') < f_2(x)$. Such a compromise solution is called Pareto solution (figure no. 2).

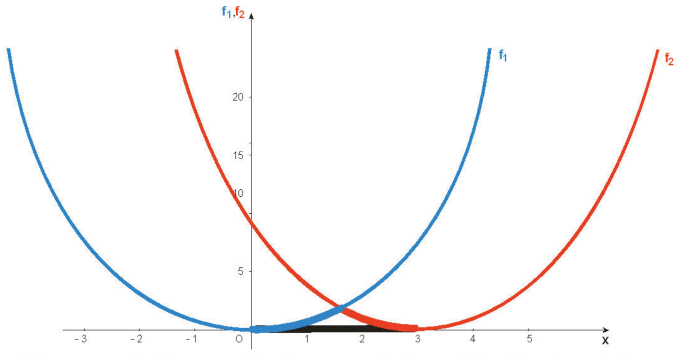

Figure no. 2. The graphical representation of the Pareto solution

An element x represents an optimal Pareto solution if there is not an element x' that $f(x')$ would dominate $f(x)$. The domination relation: y dominates y' (in a minimization problem), if $y_i <= y_i'$ for each I and the inequity is strict for at least one component (figure no.3 - first: y dominates y'; second: y does not dominate y' and neither y' does not dominate y).

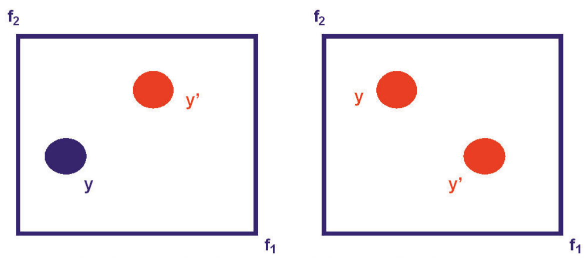

Figure no. 3. The graphical representation of the domination relation

The domination relation represents a partial order relation. The *quality* will always dominate the *purchasing costs*, and the purchasing costs will dominate the *limitative factors*. The set of all Pareto optimal elements of a multi-criteria optimization problem is called the optimal (Pareto) solution of the problem. In our case the optimal Pareto set is the interval [0,3]. The set of values associated to the elements of an optimal Pareto set is called Pareto front (figure no. 4). As a result of the identification and the analysis of the weak points of the production process of the enterprise, there were defined the operations that must be improved and subsequently the equipments that must be purchased. For the purchasing of the printing equipments the management of the enterprise turned to one of the largest producers of equipments, Heidelberg Druckmaschinen AG, world leader in the field. The motivation of the choice takes into account the performance and the reliability of the equipments, as well as the training and the experience of the SC GRAPHOTEK EXPRES SRL employees on this type of equipment. Taking into account the two solutions: $x = 9; y = 4$ or $x = 6; y = 6$, by applying the reengineering in the preliminary choice, the possible options regarding the purchasing of the optimal equipments are presented in the chart no. 1.

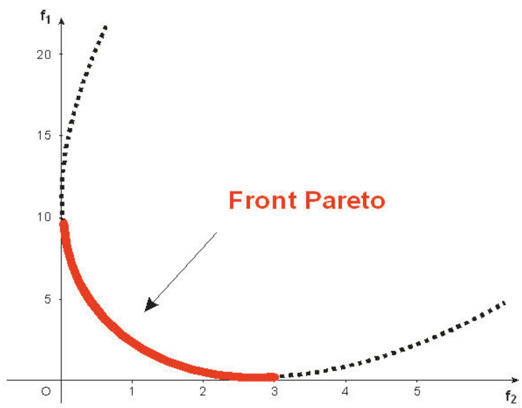

Figure no. 4. The graphical representation of the Pareto front

New machines and equipments

Chart no. 1

OPTIONS		PRINTING EQUIPMENT	FEATURES
1	x=9	**Heidelberg offset** Speedmaster SM 52 - P – 9 groups	• Maximum printing format 35x52cm • 8 printing groups + 1 punching group • Prinect CP2000 Center (Integrated management center for printing processes) • Prinect Image Control (Automated picture control system) • Prinect Axis Control (Integrated axial control) • Prinect Prepress Interface (Prepress integrated interface)
	y=4	**Heidelberg offset** Speedmaster SM 74 – 4 groups	• Maximum printing format 50x70cm • 4 printing groups • Prinect Easy Control (Integrated control system) • Prinect Press Center
2	x=6	**Heidelberg offset** Speedmaster SM 52 – 6 groups	• Maximum printing format 35x52cm • 4 printing groups • Prinect CP2000 Center (Integrated management center for printing processes) • Prinect Image Control (Automated picture control system) • Prinect Axis Control (Integrated axial control) • Prinect Prepress Interface (Prepress integrated interface) • Standard delivery with punching, numbering and printing device
	y=6	**Heidelberg offset** Speedmaster SX 74 – 6 grupuri	• Maximum printing format 50x70cm • 6 printing groups • Prinect Easy Control (Integrated control system) • Prinect Press Center • Prinect Axis Control (Integrated axial control) • Prinect Image Control (Automated picture control system)

Concluding we can state that the optimal result that respects the imposed conditions as well as the limiting factors is the option number 2.

4 Conclusions

The mathematical model represents a new approach for applying the principles of reengineering in the design of the production unit of the printing enterprise. The purpose of these models is to introduce mathematically new approaches in order to preliminary determine the tools and the equipments from the production sectors of the printing industry offering a new perspective upon the management and confirming the fact that an optimal solution of the problem of finding new equipments greatly influences the effectiveness and the efficiency of the enterprise. The contributions materialized in mathematical modelling of some variables with a significant impact upon organizations re-engineering in the printing industry: identifying the solution to a specific problem on applying re-engineering principles in the design of the production unit of a printing organization through a conceptual model focussed on the application of a mathematical method: Pareto multi-criteria optimization (multi-objective optimization, vector optimization). The necessity to change the organizational management as well as the production process defines its use and efficiency in satisfying some needs, at the local level, as well as at the national level and adds to the number of primary problems, recently appeared, the elaboration of a organizational-structural and functional-operational stimulating variety of measures, based upon processes, that are welcomed in the modernization of the management [SUSANU, I.O., CRISTACHE, N., SUSANU, V., 2009]. The reengineering and the improvement of the business processes are relevant in different circumstances. "*The continuous innovation is the best thing to do if you are already an international market leader in everything you do is not a good idea if you are behind and probably is a disastrous idea if you are far behind. The reengineering is the only possible approach to quickly come back on a competitive position*" [Johansson H.J., s.a., 1993].

Printing organizations in Romania should implement an efficient system of internal organization, thus providing increasingly better products and services. A successful organization of the printing market should adopt process management which provides products or services that meet the customers' requirements, a relationship based on consistent quality, meeting delivery terms, a motivated and well-organized team, which permanently takes into account its customer requirements.

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