

Business plan feedback for cost effective business processes

Ivanisevic, A.^{a,*}, Katic, I.^a, Buchmeister, B.^b, Leber, M.^b

^aUniversity of Novi Sad, Faculty of technical sciences, Novi Sad, Serbia

^bUniversity of Maribor, Faculty of Mechanical Engineering, Maribor, Slovenia

ABSTRACT

Business planning encompasses all the goals, strategies and actions to ensure company's business survival, prosperity, and growth. Literature review and analysis of business processes of production systems show that the business plan is considered as a rigid system, even though it is being prepared in a world of constantly changing business conditions. The possibility of correction of a business plan that is being realized in the course of a year is only a theoretical possibility, and the introduction of a feedback system as an element of correction remains only as an idea. The aim of this paper is to propose and introduce a system in the business technology that would be similar to the designing principles for automated technical systems. In the paper an original business planning model with feedback is presented. The model includes planning, monitoring and harmonization of business operations. It is appropriate for unstable conditions too, regarding the essential influences from the business environment, thus adapting the company's operations. It could be used in small- and medium-sized companies, in industries of all types. The model enables the assessment of present and future business results. Verification of the model has been successfully carried out at three levels.

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*Corresponding author:

andrea@uns.ac.rs
(Ivanisevic, A.)

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1. Introduction

Changes of business conditions affect the mechanism of income formation. This results in lower profit which sometimes leads to the loss and, not so rarely, to the shutting down of the production system. The consequences of deteriorating business conditions can be measured and, based on this, changes of some business conditions can ensue. The result of the changed business operation is calculated and if the correction is not satisfactory, the next correction is automatically proceeded with. The main elements that require correction are: cost reduction, production increase, reduction of staff, reduced salaries, etc. The preparatory work included the analysis of business operation of fifteen small and medium-sized enterprises, and a model was made based on their financial plans, planning systems, and business results. One of these companies was subjected to a test (theoretical) calculation of model application.

The main question of this research is: is it possible to develop a new model of planning, monitoring and coordination of industrial enterprises in the course of the fiscal year, as a function of the character and intensity of the impact of changes in the environment?

In accordance with the defined problem, the subject of the research presented in this paper is business planning of the industrial enterprises in the conditions of dynamic changes, and harmonization of business operations with the changes taking place in the everyday environment.

The objectives of the present study were to:

- identify the key influences from the environment and mechanisms of business operation corrections for each influence separately, providing the appropriate mathematical calculations,
- defines the procedures of harmonization of plan and business operations,
- propose a scientific description of the new model of planning, monitoring and harmonization of business operations.

The goal of the research activities was to develop a model of planning, monitoring and harmonization of operations which will apply the feedback mechanism to harmonize the operations with influences from the environment, thus adapting the company's operations with negative or positive impacts from the environment.

2. Literature overview

The literature covering the subjects of business planning distinguishes between the business planning process which is continually implemented throughout the year, i.e. procedures used for developing the plans and results of business planning [1]. In addition, there is literature that emphasizes the importance of the process of business planning because it helps understand the business and offers the possibility of learning [2].

Planning enables enterprises to have control over the achievement of the objectives. In the case of deviations from the plan, the causes of those deviations can be identified and incorporated into future business operations [3]. The supporters of business planning emphasize that the importance of business planning is particularly evident in a dynamic and unstable environment because it reduces the level of planning uncertainty, facilitates and speeds up the decision-making process [4, 5].

It is a well-known fact that the external environment of the company (suppliers, customers, etc.), as well as the company's employees, often want to see the business plan in order to assess the viability of the business and the level of attraction from an economic point of view. Thus, the process of business planning often has a purely formal character and is a result of certain internal and external pressures due to obligations and legitimacy, instead of being an instrument to ensure better business results. Several authors [6] recognized these tendencies and described them. As it can be expected, the studies dealing with the analysis of the planning system in companies which do not have it as a formal process, determine different effects on business compared to those companies which focus solely on written documentation as a result of following the business plan during the year without reviewing it [7].

The literature proposes two options to help the company ensure continuity and stable operation, that is, its survival and development [8]. The first option proposes greater degree of company's isolation from the environment which implies break of company's relations with its own environment, and, although possible, this does not give a positive result. Another option is to build mechanisms by which the company would regulate its own functioning, i.e. to adapt the operating system to external influences.

The process of adaptation introduces changes in the system in order to achieve stability and continuity of business operations. Adaptability exists in the degree to which the system can survive the changes caused by the external environment, i.e. viability equals the adaptability [9]. Some companies find it difficult to adapt to changes occurring in the environment for several reasons. Companies often do not have developed systems to monitor the changes occurring in the environment, and systems that register different types of impacts. How to implement changes is a key question for every organization or company. Change management (also known as change control) is a professional discipline, which focuses on supporting organizations on their way to a successful transition from a less-than-ideal status quo to a desired future state. Change management is one of the skills every manager should master to a sufficient degree because it represents an integral part of business operations and the process of constant change. It denotes

a dispersed set of processes, tools, techniques, methods and approaches for achieving a desired state through change.

Change management approaches have two main objectives:

- to assist the organization in achieving its goals which cannot be attained with the existing organizational structure, functioning and client servicing, and
- to minimize the adverse effects of any changes made [10].

The implementation of lean manufacturing methods is very important for optimization of business processes. Nguyen described the implementation of lean concepts in the context of developing countries [11]. Adjustment of the structure and parameters of production systems should ensure the operation of these systems in more favourable manufacturing and economic conditions [12]. This process is often directly linked with the starting of investment process with the goal of achieving minimal production costs [13].

When it comes to adjusting the mechanisms of company's operations to the changes that result from internal and / or external influences, contemporary literature commonly uses the term of "adjustment of business operations based on the feedback mechanism"; however, it does not offer an elaborate and usable model. As this is the main subject of this paper, the review of relating literature has shown that except the theoretical explanations, there is no operationalization of the subject model.

3. Research

The management and planning models are mainly oriented towards the future, giving priority to the preventive control over subsequent control, with the aim of undertaking the prevention measures before the differences between the planned and actual performance occur.

It is clear that, in a number of cases, the recognition of deviations outside the set limits is much more important because, then, there is a need to redefine the initially established plans and make them more flexible. Thus, the control can be viewed as a causal variable that provides input for improvement of planning and organization in the event of changes in the internal or external environment.

A number of control classifications can be found in literature, and one of them is the division into:

- preventive, feedforward control,
- corrective, feedback control.

The preventive control (feedforward control system) was noted to be more effective when applied to business processes because, in the corrective control system (feedback system), the correction output is returned to the process flow. With preventive control (feedforward system), the unwanted variations of inputs are returned to the flow of inputs to be corrected, or into the process itself, before the output is completed.

Preventive control should be defined by comparing it with subsequent control which has been defined by the authors for different disciplines, but which basic idea can be easily applied in the field of management.

Considering the existence of different views, different approaches and, finally, the existence of different planning systems in companies, a general conclusion is that there is no consistent concept or model of a business plan that can be uniquely determined and widely accepted. This paper is a contribution to the development of this issue, as it sets a model of flexible business planning system based on the principles of feedback mechanism.

The main purpose and objective of a business plan is to define the criteria for basic principles and directions of business operations during a fiscal year so that the fiscal year can end within the limits of forecasted or reduced, but still above the minimum projected profit. As the business plan is typically made before the start of the fiscal, usually a calendar year, there is a fact that that it is very difficult to predict all operating conditions, the intensity of external and internal changes, and the impact on the realization of the business plan during the year.

A complete basic business plan of a production system and its harmonization with altered business conditions can be only considered as a guideline for appropriate corrections of the business system and allocation of resources that the production system has at its disposal.

Bearing in mind that unstable conditions make it almost impossible to predict, with high accuracy, all possible changes of the conditions, the only option that remains is to define the business plan only as the starting framework so that it can be corrected in accordance with the changes of various external and/or internal influences, but it also to show the company's management possible directions of business operations in order to stop, slow down or improve the negative trends of profit and/or other performance indicators.

The basic principles are illustrated with short explanations and illustrations.

This is a flexible business plan that allows introduction of changes based on which the effects on profit are automatically calculated, and it proposes orders for the correction of some elements of the business which makes it a system with the feedback (Fig. 1).

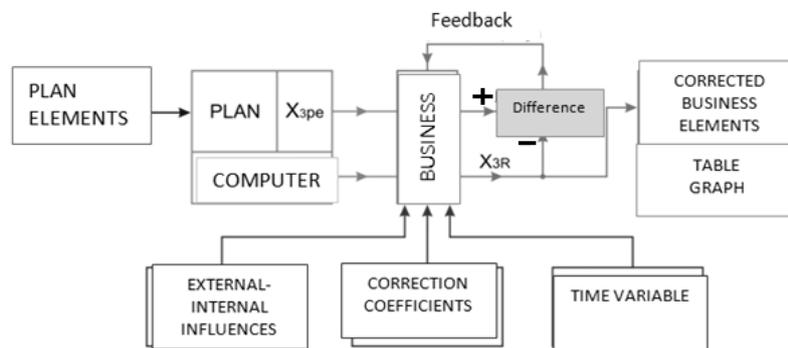


Fig. 1 Block diagram of the mechanism of business planning with feedback

The difference between total income (X_1) and total expenditures (X_2) is the profit of business system (X_{3pl}). External and internal influences affect X_1 and X_2 directly and, through them, reduce the planned profit (X_{3pl}). According to the model developed in the study (PPS), the amount of profit calculated with respect to external or internal type of „influences“, and the calculated value for profit (X_{3R}) are automatically introduced as the correction coefficients which number and numerical value show the type of change and average annual profit $K = f(X_3)$. The whole process of calculation of profit and correction coefficients is completed automatically except the occurred changes which are imported manually in accordance with the criteria defined by the model.

The necessary basis for the application of business plan with feedback (PPS) is the preparation of the basic business plan which structure is adjusted to the program of profit calculation with respect to the type and intensity of the change „*El influence*“.

3.1 Business plan model

Table 1 shows a list and groups of elements of the plan, each with a mark that is used in the overall model of business planning with feedback (PPS) regardless of whether it is an analysis, computer processing or other activities.

Every group of the plan elements is elaborated thoroughly and the plan will include only planned numerical values of the elements that are valid for a company that uses them.

The business plan is done annually (Table 1). It is prepared based on the projections for a business year and, as such, it is unalterable regardless of external and/or internal changes. There is the large number of different negative 'influences' on business operations:

- *external influences*: inflation, reduction in sales volume, increase in energy prices, reduction in product prices, increase in transport costs, increase in contribution and taxes, increase in business costs, increase in loan interests and other,
- *internal influences*: increase in personal incomes, reduction in production, increase in credit debt, inadequate maintenance services, unplanned failure of machines and other.

Table 1 The concept of business plan – basis for the model construction

Mark	Name of variable	Basis for the plan or calculation
X_1	TOTAL INCOME	Calculated
X_2	TOTAL EXPENDITURES	Calculated
X_{21}	<i>BUSINESS EXPENDITURES</i>	Calculated
X_{22}	<i>INVESTMENTS</i>	Planned
X_{23}	<i>FINANCIAL EXPENDITURES</i>	Calculated
X_{24}	<i>OTHER EXPENDITURES</i>	Calculated
X_3	PROFIT $X_1 - X_2$	Calculated

It is certain that a unique automatic program cannot include all the influences on business operations because of both a large number of variables and the fact that those variables do not often act individually. Usually, there is a combination of two or three variables at the same time and they often have different influence on business operations with the same performance. This way, for example, the following can be combined: reduction in sales volume and price reduction.

In addition, the degree of change of different EI influences on business operations can neither be equal.

By combining different number of influences of varying intensity and level that can be made on business operations, then thousands of different groups of influences can be obtained which would make the planned and designed model completely useless, not only because of a large number of combinations but because of the numerous mistakes that can be made in case of development of the model itself and definition of initial numerical values of influences and numerical valorization of the degree of their impact on business operations.

The selected 'influences' can be divided into two groups and are included in the business planning model with feedback (PPS) in the data processing which is used for:

- a) automatic calculation of the profit with feedback (reduction in sales volume, production price, increase in costs of business operations) and
- b) analysis of EI influences only for the calculation of the future business results on a one-time basis without any corrections and feedback (increase in the price of raw materials and energy prices, increase in employees' incomes, increase in values of external services and internal costs).

3.2 Definition of typical zones of profit and introduction of business correction coefficients

The basic criteria for business performance – profit (X_3) in PPS model is determined by five typical levels and four zones of profit (Fig. 2).

The set levels and zones of profit are defined in the PPS model based in Fig. 2. However, considering the fact that it is an open model, the levels and zones can be changed in accordance with the concepts of company's management or specific position of a company on the market.

A. Start: Planned profit X_{3R} – the first zone at the beginning of the planned period X_{3pl} .

B. Second profit level which is in compliance with the established relationship between the calculated and planned profits:

$$X_{3r1} = 0.55 \cdot X_{3pl} \quad (1)$$

C. Third profit level complies with the established relationship between calculated and planned profits:

$$X_{3r2} = 0.30 \cdot X_{3pl} \quad (2)$$

D. Fourth profit level complies with the established relationship between calculated and planned profits:

$$X_{3r3} = 0.15 \cdot X_{3pl} \quad (3)$$

E. Fifth profit level complies with the established relationship between calculated and planned profits:

$$X_{3kr} = 0.10 \cdot X_{3pl} \quad (4)$$

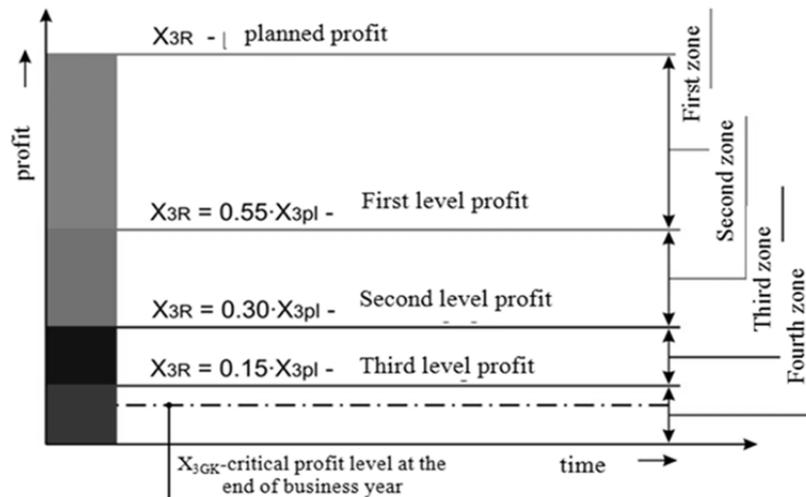


Fig. 2 Typical levels and zones of profit in case of EI influences (X_{3pl} – planned level of profit; X_{3R} – calculated level of profit 1, 2 or 3; X_{3kr} – critical level of profit)

Coefficients for defining the profit levels are provisional (0.55, 0.30, and 0.15) and can be changed.

Four zones of profit, which depends on the intensity of EI influences, are defined within the specified values (Fig. 2) and this paper focuses only on the summary of the research (model):

- **first zone** in which the calculated profit ranges: $0.55 \cdot X_{3pl} \leq X_{3r} \leq X_{3pl}$ – a zone in which *no correction of business operations is performed*,
- **second zone** in which the calculated profit ranges: $0.3 \cdot X_{3pl} \leq X_{3r} \leq 0.55 \cdot X_{3pl}$ – a zone in which *the first level of correction of business operations K1 is introduced on a one-time basis* based on the criteria defined for each EI influence separately,
- **third zone** in which the calculated profit ranges: $0.15 \cdot X_{3pl} \leq X_{3r} \leq 0.30 \cdot X_{3pl}$ – a zone in which *the second level of correction of business operations K2 is introduced on a one-time basis* based on the criteria defined for each EI influence separately,
- **fourth zone** in which the calculated profit ranges: $0.00 \cdot X_{3pl} \leq X_{3r} \leq 0.15 \cdot X_{3pl}$ – a zone in which *the third level of correction of business operations K3 is introduced on a one-time basis* based on the criteria defined for each EI influence separately; the critical level of minimum allowed profit X_{3kr} is in this zone.

At the third level of correction (the fourth zone of profit), the system of feedback is introduced based on three bases:

- **first**, when, after the introduction of the first corrective measures ($K3.1$), the profit remains in the fourth zone and does not pass into the second zone, the correction is repeated ($K3.1$),
- **second**, when, after the introduction of the first corrective measures ($K3.1$), the profit changes and passes into the third zone and during further business operations it again enters the fourth zone – the second corrective measures are introduced ($K3.2$), and
- **third**, when the profit is below the critical level X_{3kr} and when the third level of corrective measures is introduced, comprising repeated corrections $K3.1$, and then $K3.2$ until the profit is increased above the critical level.

The reduction of the planned profit X_{3pl} to the level indicated later in Fig. 4 as $X_{3,12}$ is the result of EI influences and depends on the *SPV* coefficient. When the decrease in the profit is so large that the profit passes into the second zone ($0.55 \cdot X_{3pl} \leq X_{3R} \leq X_{3pl}$), the business operations are corrected based on the defined criteria.

A new variable is introduced in the business planning model with feedback: *time and duration of the change*, and then it is connected with the *calculated results of business operations* which are presented through the achieved profit. This is done because of adverse effects which, besides

they appear in different periods of a year, never change evenly during a year, 1 %, 2 %, 3 % (for example, there is an increase of 1 % every month). When we take into account the time constant, we should bear in mind that the change in business plan could be analyzed ahead by defined time cut-off points and/or at the moment of change.

A system of parallel monitoring in time (for example, every month) and at the time of change have to be applied for the complete PPS model application. Therefore, conceptually different profits can be defined:

- *planned profit* (X_{3pl}),
- *present value* of the profit in the month when such a change occurred or at any other cut-off point X_{3R} ,
- *average profit* of a company in the period *preceding the change* (X_{3P}), including the profit in the month when the change occurred (analyzing the influence of the change on the profit in the preceding period), and
- *average profit* of a company *during a year* (X_{3G}) under the conditions when the last change occurred in the current year (analyzing the influence resulting from the change on the business operations throughout a year).

Mathematical interpretation of the influence of 'time and duration of change' variable on the profit for all three methods is presented graphically in Figs. 3 and 4.

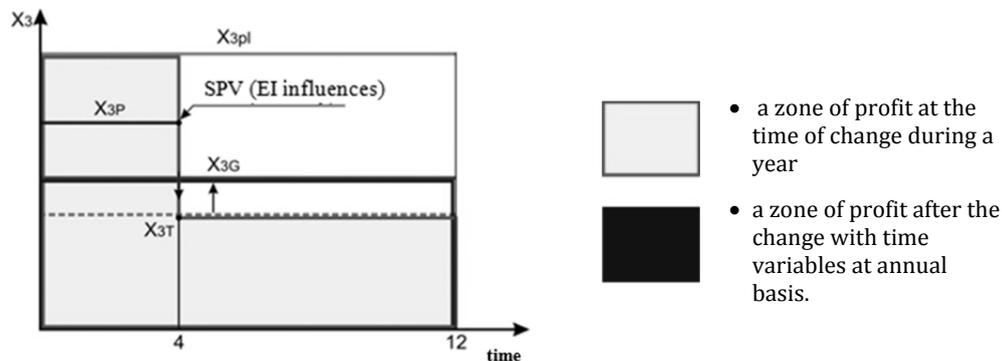


Fig. 3 Graphical overview of defining a profit

Fig. 3 shows an average profit during a year (distributed to 12 months), X_{3G} .

The numerical value at the cut-off point (i) at annual basis is calculated based on the following equation:

$$X_{3Gi} = \frac{X_{3G(i-1)} \cdot m}{m_G} + \frac{X_{3Gi} \cdot (12 - m)}{m_G} \quad (5)$$

where i is a cut-off point during which a profit is calculated at annual basis, m is a number of months of business operations to the i -cut-off point, m_G is a number of months in a year ($m_G = 12$), X_{3Gi} is the calculated level of profit at the i -cut-off point of change in EI conditions, obtained as a difference between total revenues and total expenditures, $X_{3G(i-1)}$ is the calculated level of profit at previous cut-off point of change in EI conditions.

The calculation of change in profit is presented graphically in Fig. 4. Fig. 4 shows the calculation of corrections of business operations under the modified business conditions which, in the planned year, lead to the fall in planned profit during a year at all levels. When the business conditions, which have adverse effects, change and the profit falls from X_{3pl} to $X_{3.11}$ (at annual level, but not below the limit which is marked with the first level $X_3 = 0.55 \cdot X_{3pl}$), the first correction $K1$ is made, and then by applying the mechanism of calculation based on 'time variable', the planned profit falls annually (or it does not fall) to the level $X_{32.1}$ at annual basis. In case that, for example, the business conditions change during a year and the profit falls under the level 2 ($X_{3R} = 0.30 \cdot X_{3pl}$), then the correction is made based on the criterion defined as $K2$. If the hypothetically defined fall in profit continues during a year, then the correction $K3$ is made.

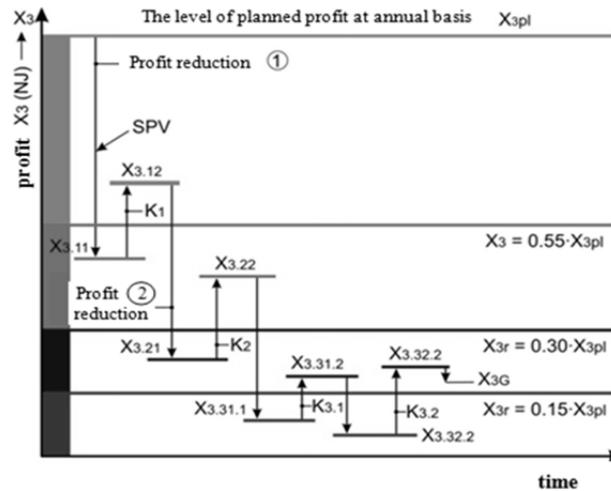


Fig. 4 The change in designed profit due to EI influences and mechanisms of corrections of business operations – K_1 ; K_2 ; $K_{3.1}$; $K_{3.2}$

All impacts on business, which lead to the fall in profit, and correction coefficients are clearly marked within the model and they are only numerically valued due to mathematical processing of the model and they can be easily defined in line with the business conditions of the company which implements the described model. This has already been done because, for example, the increase in the fuel price has different influence on business operations of the transportation company then on the business operations of the metalworking company.

3.3 Mathematical statement of business plan elements and procedures of corrections of business operations

In mathematical statement of the PPS model, elements of the plan can be divided into several groups with the same mechanism of operation:

- Elements of the plan that change due to external-internal influences (through changes defined as SPV). Those are the initial changes and their numerical value follow the change of EI influences.
- Elements of the plan that change (through PKP coefficient) in compliance with the change of EI influences, follow it because of the plan correction, and they are introduced when the profit is in the zones 1, 2 or 3 (presented in Fig. 2). Those are the elements of correction of costs which aim is to achieve the harmonization between the reduced and planned (X_3) profits. The numerical value of these variable coefficients of the plan correction (PKP) follows, with the same percentage, the change in EI influences expressed through SPV coefficient.
- Elements that are defined and constant until the next planned change (through KPK coefficient), the so-called constant elements ($KPK1 = 1 \cdot Y$, that is, $KPK2 = 0.5 \cdot Y$; Y in %) and corrections of plan costs with the aim of adjustment are reduced by the planned (X_3) profit. The introduction of KPK is not related to the change in SPV but to the moment the profit enters critical zone 3.

Mathematical statement of a single case of impact – reduction in the product price:

$$X_3 = (X_{11} + X_{12}) \cdot SPV - ((X_{211} + X_{212} + X_{213} \cdot PKP + X_{214} \cdot KPK + X_{215} \cdot PKP) + (X_{221} + X_{222} \cdot PKP) + (X_{231} \cdot PKP + X_{232} \cdot PKP + X_{233} \cdot PKP + X_{234} \cdot PKP + X_{235} \cdot PKP)) \quad (6)$$

where:

$$SPV (PKP; RKP) = 1 - \frac{Y}{100} \quad (7)$$

and Y is a change (reduction – ; increase +) in %, SPV is a constant change in business operations, initial influence, PKP is a variable coefficient of correction of business operations, KPK is a constant coefficient of correction of business operations, X_{11} are the revenues from domestic market; X_{12} are the revenues from foreign market, X_{211} are the costs of raw materials from domestic market, X_{212} are the costs of raw materials from foreign market, X_{213} are the production services, X_{214} are the personal incomes, X_{215} is the investment and development, X_{221} are the costs of credit, X_{222} are other financial expenses, X_{231} are the costs of fuel and energy, X_{232} are the costs of transportation services, X_{233} are the maintenance costs, X_{234} are non-production services, X_{235} are other expenses.

4. Concluding remarks

A flexible planning system, which follows the logic of thinking, that is, understanding of the company's management, should result in generally accepted business philosophy around the world – profit maximization.

The research on needs, possibilities for design and implementation of business planning model with feedback were carried out based on the formulated hypotheses.

The achieved level of research in the field which is the topic of this paper (business planning with feedback) was analyzed during preparatory works. A large number of papers deal with the problem of doing business in unstable conditions and demonstrate the need to implement business planning with feedback. Some principles are mentioned, however, the designed model, or its preliminary version, could not be discovered. In the paper, this idea was developed and designed in a model-based research.

Verification of a company's business planning model with feedback (PPS), as a process of adjustment of company's business operations with plans under the influence of environment, was carried out at three levels. The aim of the verification was to:

- a) Include the most important elements of business operations in the plan which was defined as alterable for companies of different size and configuration,
- b) Examine the possibilities for implementation of model in the company's business,
- c) Analyze the achieved results, assess their real meaning and application in current business operations,
- d) Examine the possibilities for implementation of the model in the process of assessment of business results in the future, assumed business conditions and anticipated influences from the environment.

Based on the conducted research, the goal to develop a verified model for business planning, monitoring and harmonization has been achieved.

The model proposed in this paper can be upgraded in various ways. One option is to upgrade this model with the change management model.

Given the complexity of the problem, the dynamics of changes in the environment and lack of the correct solutions in the literature, even in its initial form, the aim is to continue with the research on this topic with focus on:

- Programming of the business planning model with feedback (PPS) in some of the software applications which configuration is regulated to solve the mentioned problem.
- Implementation of the business planning model with feedback (PPS) in a few selected typical companies, according to which the entire process of planning, monitoring of changes and results of business operations would be adjusted with the model.

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