IMPORTANCE OF FORECASTING IN ENTERPRISE MANAGEMENT

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Abstract: Planning and forecasting are regarded to be the basis for rational decision-making. This study presents the problems and concepts connected with management of enterprises, with particular focus on forecasting its future operation. Development of proper forecasts necessitates the knowledge of the methods and ability to analyse and evaluate the changing conditions in micro- and macro-environment. Skilful using the forecasts is the basis for making optimum decisions in managing the enterprises.

Keywords: forecasting, planning, management, enterprise

1. Introduction

Competitiveness of market economy determines the variability of demand for particular goods. Level of production should reflect customer demands. This demand can be estimated by means of forecasting.

The goal of forecasting is providing possible most objective and substantial prerequisites for making business decisions and analysis of the events that might occur.

The need for forecasting is inherent in each enterprise, regardless of whether they manufacture, provide services or sell goods. The enterprises are established in order to meet the particular needs of their customers, by using for the purpose capital, tangible and human resources and by taking actions so that the owners, managers and other employees in the enterprises earn incomes whereas the enterprise is provided with the opportunities for development [1]. The most important tasks for the managers is to formulate [2]:

- the mission (general goal that points to the causes and basis for existence of the enterprise),
- domain of the activities,
- long-term goals,
- strategy for achievement of the goals,
- type of production,
- technological level of development.

2. Forecasting in enterprise management

Formulation of the tasks by the managers contributes to planning and taking appropriate actions and allows for evaluation of the enterprise's performance. Taking right decisions is preceded by an in-depth analysis of the resources and means available in the enterprise and the tools and methods that can be used. Therefore, it is essential that forecasting is used in

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decision-making processes as it might contribute to improved accuracy of decision-making. Forecasting in production enterprises allow for finding the most probable course of processes. When defining the most important tasks for the enterprise, the managers should be based on the forecasts for [3]:

- demand for the goods that can be manufactured by the enterprise,
- demand in individual market segments,
- general economic conditions,
- technological changes,
- actions taken by competitors,
- possible changes inside the enterprise (manufacturing, costs, staffs, technical means, profits, etc.),
- particular industry.

The aim of the **forecasting system in the enterprise** is providing information about future changes in the business environment and the impact of these changes on the enterprise in the form of forecasts. Using the tasks of this system might be assigned to a special department or to current units that use the forecasts prepared.

When building the forecasting system in the enterprise, one should be guided by the principle of rational actions, i.e. the costs of system functioning should be lower than the benefits earned on the system. This means the efficient organization of the system on the one hand and care of forecasting quality on the other. The essential component of the functioning of a system is collecting, selection and analysis of internal and external data [3].

The data should meet a number of formal criteria, such as availability, completeness and comparability. Therefore, forecasting should determine the opportunities of collecting sufficient amount of information about the enterprise, with particular focus on logistics of production. A set of the data that determine the wholeness of the activities of production logistics in the enterprise is also necessary. Data usefulness in the particular scope is ensured by their sectoral and temporal comparability.

Organization of the forecasting system and obtaining the forecast should take into consideration the relationships among the variables. The data used in forecasting often allow for separation of the **leading** and **mimicking** variables, adopted both in the set of external and internal variables.

The division of the variables into leading and mimicking ones is carried out separately in the sets of external and internal data for the purposes of production logistics. The choice of the external leading variables is made based on the mutual delays in these variables (temporal correlations), whereas the internal variables are chosen by determination of the correlations with the external leading variables. An internal leading variable is the variable which responds to the effect of the environment. It should be expected that in the normally functioning market economy, a fundamental leading variable can be estimated. This usually means the sales level. Definition of the leading variable allows for forecasting of other variables using temporal effects of the environment in the area of production logistics.

This procedure is termed **sequential forecasting procedure**. Its essence is presented in Fig. 1.

An essential part of managing enterprises is ability to forecast future events, i.e. forecasting. No decision can be made without accurate and precise forecasts as they

primarily concern the enterprise's future. Therefore, the causes of development of forecasts in the enterprise are:

- uncertainty,
- delay in time between the moment when the decision is made and its effects.

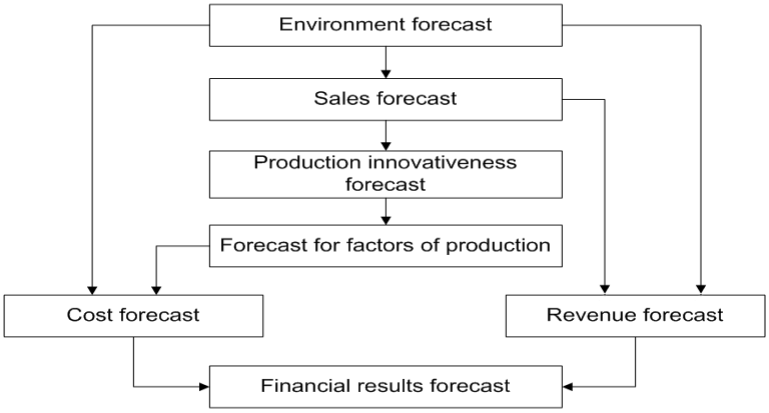

Figure 1. Sequential forecasting in the enterprise [4]

Uncertainty of the future results depends on the conditions of the enterprise's functioning. The factors in the environment that affect decision-making processes are sometimes beyond the enterprise's control. With regard to the level of knowledge about possible factors in the environment that might occur, the following conditions can be found [5]:

- conditions of certainty i.e. knowledge of the enterprise's environment,
- conditions of risk, when the likelihood of possible variants in the environment state is known,
- conditions of uncertainty i.e. lack of knowledge of the likelihood of the possible variants of the environment state
- conditions of incomplete information, which are connected with the lack of knowledge of all the possible variants of the environment state.

The enterprise's environment in this case concerns the marketing environment, which is regarded to be *'a set of external factors, directly or indirectly affecting the enterprise's operation'* [5]. It can be divided into:

1. marketing micro-environment (Fig. 2),
2. marketing macro-environment (Fig. 3).

Each of the factors presented in Fig. 2 and 3 affect production logistics, either directly or indirectly. For example, customers stimulate demand through deciding on the production scale, its seasonality or searching for modern products. Forecasting of these important economic phenomena in production enterprises is connected with logistics.

Therefore, effective management of the enterprise necessitates large amounts of information about the enterprise's environment and ability to forecast interrelations in the business entity and the factors that affect the management processes. Similar to

microeconomic components, the macroeconomic components in a production enterprise are determined by the scope of logistics solutions. However, it is important that the forecasts are adequately made for production logistics in the enterprise.

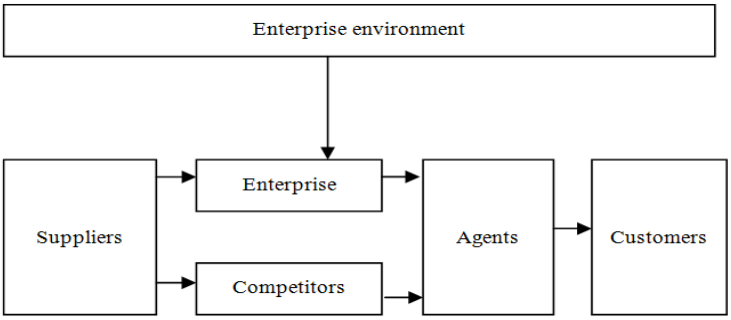

Figure 2. Components of the enterprise's microenvironment [5]

There is a number of different definitions of forecasts available in the literature. For the purposes of the present study, the author adopted **a forecast** that is *'a judgement of the likelihood of a particular event at the time defined with the accuracy of a moment (point) or a period (range) of time in the future'* [4]. This judgement should have the following characteristics:

- be formulated using the achievements of modern science,
- relate to a predefined future,
- be empirically verifiable,
- be uncertain but acceptable.

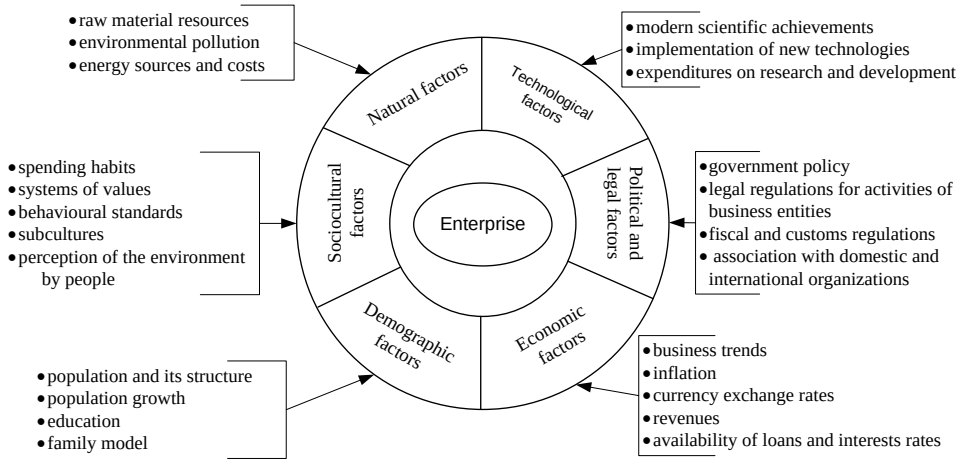

Figure 3. The main components of the marketing macro-environment of the enterprise [5]

Forecasting is based on **predicting**, thus on *'inferring about the unknown event based on the already known ones'* [4].

Forecasting the future means pointing to the future goals, means and methods of operation in order to achieve the forecast objectives. Forecasting relates to the methodological basis for the patterns of material flow in production enterprises.

When forecasting, one should not neglect current theories. Formal models of individual processes that occur in a production enterprise should correspond to the theoretical assumptions which are connected with production processes. Proper forecasts can be obtained only if a model that corresponds to theoretical assumptions is developed (Fig. 4).

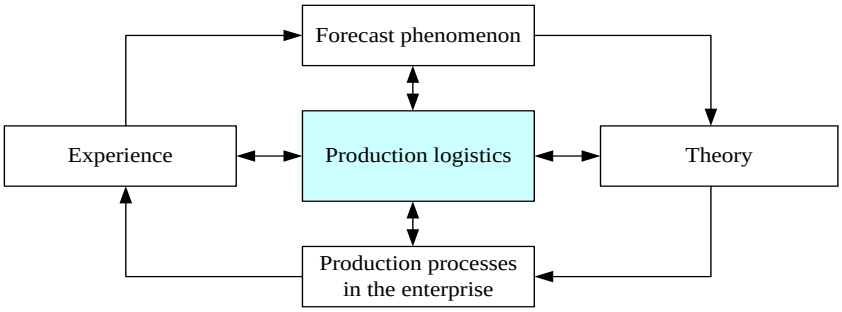

Figure 4. Using theory in forecasting of production logistics [4]

Theoretical investigations should be based on the experiences that result from economic practice. This practice is used for obtaining information about production processes in order to proceed to production logistics itself. An important factor is the validity of forecasting assumptions, combined with accuracy and reliability.

With regard to production logistics, making a forecast necessitates a particular sequence of activities. Therefore, forecasting is a sequential process, which is composed of the following stages [4]:

1. Formulation of the forecast task in the area of production logistics
2. Definition of forecast prerequisites
3. Choice of the forecasting method
4. Making a forecast for the processes of production logistics
5. Evaluation of forecast acceptability
6. Verification of the forecast

Forecasting is possible if suitable data are available. The data are obtained in the process of collecting statistical information. The data used in the process of forecasting can be divided into [7]:

- qualitative data,
- quantitative data.

The qualitative data allow for describing the pattern and importance of the factors that affect particular events. They largely depend on a subjective judgement of an expert or a planner. The qualitative data are used in the case of forecasting by means of such tools as Delphi, decision trees or Monte Carlo method. The quantitative observations are the basis for the analysis of the phenomena and processes in the economy [7]. One of the forms of presentation of quantitative data is time series, which are the series of observations found

for a particular phenomenon at consecutive time units [9]. They are the basic source of information about the status of the economic entities such as enterprises. Time series that describe economic processes are termed economic series [8]. However, it should be noted that economic series might include non-standard observations, which are the signals about the changes in previous trends and in the environment where the analysed phenomenon occurs. Therefore, making a forecast should include evaluation of the observations in terms of their atypicality [10].

With regard to the type of the data used for forecasting, with particular focus on building models used as a basis for forecasts, there are qualitative and quantitative forecasting methods.

Quantitative methods are based on forecasting models constructed based on time series. They include e.g. models of trends, linear regression, econometric models, analog models. Therefore, forecasting of the future utilizes statistical and economical models, mathematical models and optimization models. Opportunities for using quantitative methods are determined by availability of particular data. Therefore, it is necessary to collect, process and extrapolate historical data. Although quantitative methods are regarded to be more objective than the qualitative ones, application of these methods makes sense mainly in short-term forecasts.

Qualitative methods allow for description and forecasting of events that cannot always be examined based on the historical data. They are based on intuition and experience from the past, concerning the way a particular variable changes. The qualitative methods are also termed as intuitive methods and are numbered among subjective methods since the results obtained depend on conscious creation of the past and on the ability of a forecaster to order and associate particular pieces of information with each other.

The variety of forecasting methods results from complexity of production processes in the enterprise with respect to the demand of the consumers. Using appropriate methods is the basic prerequisite for improvement in production logistics in the enterprise.

Managing enterprises is connected with the process of decision-making. This process can be defined as choosing the best possible action from a set of possible procedures. However, making decisions involves the risk of failure and the activities are usually performed under conditions of risk, uncertainty or incomplete information [5]. Furthermore, the decisions usually concern closer or more remote future which is not always known to the decision-maker. This uncertainty increases as the enterprise develops e.g. if the enterprise extends its markets, new competitors emerge or consumer expectations change.

In small enterprises, decisions must be based on intuition and experience of the decision-makers. Having information about present and future status of logistics solutions affects the improvement in the quality of decision-making process and increases the accuracy of the decisions made in production enterprises.

The discrepancy between the available information set and the information set that the decision-maker needs is termed information gap. Information gap might refer to the need for information which is more topical, updated, more detailed or the information that has never been collected so far. The decision-making process might also necessitate the information concerning the future of the enterprise and its marketing environment - thus the demand for forecasts might occur. Therefore, the forecasts are important factor in managing production enterprises and used in strategic and operational management for the purposes of logistics.

The basis for the decision-making process is planning and forecasting. Both planning and forecasting are processes that necessitate collecting and processing particular information and application of certain methods and technologies of processing. In practice, it is difficult to differentiate between a plan and a forecast, but the concepts are not the same. The relationships between forecasting and planning are presented in Fig. 5.

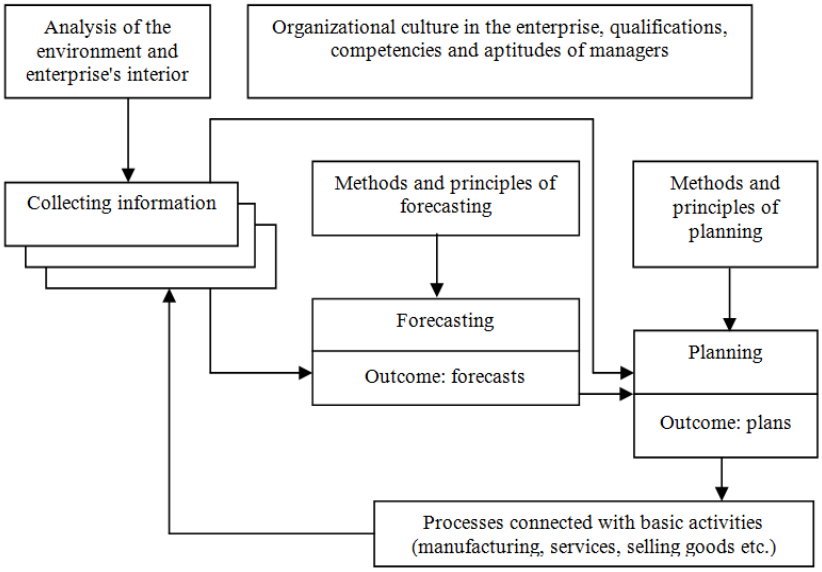

Figure 5. The relationships between forecasting and planning in the decision-making process [12]

Therefore, the process of planning should differentiate between forecasting and planning. A forecast is a scientific judgement concerning the likelihood of a particular events in the future [4]. Although this judgement is uncertain, it is acceptable. On the other hand, planning is a process where [11]:

- the relationships between the forecast variables are analysed and the type and tactics for operations are chosen,
- the future effects of decisions are defined in order to limit the uncertainty of operations,
- the best (according to a particular criterion) variant of activities is chosen and deviations for performing this variant are analysed.

Therefore, planning includes forecasting methods, extended with irrational behaviours, experiences, manager's intuition and experts. Thus, forecasting is a part of the process of planning [12].

Planning involves setting goals, the tasks that result from the adopted goals and the means to achieve the set goals. Planning allows for taking control of enterprise's activities through comparison of the values assumed in the plan with the values that actually occurred. This allows for early detection of non-conformities and deviations and taking suitable actions. Therefore, a plan means a set of decisions that assume active stimulation

of the enterprise's development through influencing the processes that occur in the enterprise so that the demanded objectives are met [13].

Economic forecasting is used in particular at the stage of long-term, medium-term and short-term planning. Therefore, the prospective, strategic and operational planning can be emphasized.

The strategic planning involves first definition of the mission and the value of the entity and then strategic goals and analysis of the external and internal environment and formulation of the strategic tasks that result from the previously defined strategic goals. The next step involves building variants for achievement of tasks and choosing the best variant and emergency variant (defined also as emergency plan, plan for crisis situation, etc.).

After development of the strategic plan, the strategic programs are built for individual areas of the operation of the enterprise and its organizational units. The strategic plan is the basis for building operational plans in production enterprises and its organizational units in the context of logistics.

Operational planning means making the decision on who will perform a particular task, when, where and determination of the methods of performing this task. In the most of the cases, making decisions is identical with creation of risk.

The process of planning, and, consequently, forecasting should be carried out based on the following planes [11]:

1. strategic (long-term): in strategic forecasting, the tangible-market strategies and the tangible, human and financial resources are defined,
2. operational and tactical (short-term and aggregate for partial plans): the focus in operational and tactical forecasting is on short-term activities that affect the enterprise's strategy, thus forecasting of the results such as balance sheet, profit-and-loss account, *cash flow.*

Planning and forecasting should be the stepping processes. The developed plans and forecasts should be constantly compared with actual data and updated. Furthermore, the accuracy and validity of forecasts should also be verified. In the case of low validity or accuracy of the forecast, one should change or correct the used forecasting model. Therefore, constructing the forecasting model should also be a process. Similarly to forecasting methods, this process should be constantly compared with current values of the forecast variable and adapted to the changes that occur in the forecast phenomenon, which are usually of stochastic nature. This causes that the actual deviations of the forecast values from the assumed data might occur.

Making forecasts is aimed at limitation of the uncertainty in the decision-making process. It should be remembered that a forecast does not replace the plan, but it is an integral part of this plan.

The process of both strategic and operational planning and forecasting should be differentiated. The focus of strategic planning and forecasting is [12]:

1. definition of product strategies and resources necessary to implement these strategies and the size and structure of the enterprise,
2. choice of the organizational and legal status and suitable management system.

Operational planning and forecasting concerns different areas of the enterprise, such as sales, production or costs.

Strategic and operational planning and forecasting are based on (see Tab. I.) [12]:

1. enterprise analyses (e.g. analysis of weaknesses and strengths),
2. environment analysis (e.g. market analyses and forecasts for present and future products).

Table I. Types of analyses and forecasts [12]

Type of analysis / ***Source of analysis***	**Structural (qualitative) analyses and forecasts**	**business trend (quantitative) analyses and forecasts**
Internal analyses *Enterprise analysis*	▪ weaknesses and strengths of the enterprise's products and markets ▪ localization factors ▪ cooperation opportunities ▪ innovation abilities ▪ property relations	▪ previous sales with division into products, customers and distribution channels ▪ learning curve ▪ annual cycle of labour (distribution of holidays within a year)
External observations *Analysis of the environment*	▪ weaknesses and strengths of competitors ▪ fashion trends ▪ structures of the resources ▪ dominant external bottleneck points	▪ demand level ▪ prices of raw materials ▪ prices of labour force ▪ seasonal trends ▪ population growth ▪ weather forecasts

Prognosis also involves some inconveniences such as [12]:

- lack of historical data in the enterprise, thus lack of source information,
- problems of current management take too much time, which results in lack of time for preparation of forecasts,
- lack of employees with suitable competencies, lack of the departments responsible for forecasting,
- excessive deviations of plans from actual states, which causes lack of confidence in forecasting.

The main goal of forecasts is support for information and decision-making processes in the enterprise. The most of the variables that characterize the processes that occur in the enterprise are regarded as controlled variables, thus the variables that can be affected through actions of the decision-makers. These activities are possible if the competencies of forecasting future events are developed. If a decline is predicted in supplies of materials, semi-finished products or goods for previous suppliers in the nearest future, the enterprises are likely to find other entities where they will buy necessary raw materials or find another solution to this problem. Knowledge about the future and finding several possible versions is the focus of **research forecasts.** Among these, one can emphasize **warning forecasts**, which allow for forecasting the events that are unfavourable for the recipient of the forecast. This causes that the presumption determined based on the information sent within the time series in the future moment will be less advantageous than at the moment T_{n-1}. The warning forecasts give enterprises the time for changing the unfavourable tendencies.

Because forecasts support decision making, they also perform the following functions in production enterprises [4]:

- preparation function,

- activation function,
- information function.

The preparation function is the basis function of the forecasts, which regards forecast as 'an activity that prepares for another activity'. **The activation function** consists in stimulating actions that are conducive to realization of the forecast if it assumes favourable changes or which prevent the realization if the forecast events are unfavourable for the production enterprise. **The information function** supports making employees aware of the changes and reducing the fear for the future.

Summary

The above investigations show that forecasting is a serious problem in enterprise management. The decisions concerning all the problems connected with enterprise functioning, including production logistics should be based on business forecasts in order to optimize the operations.

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