




Presenting a model for explaining the effect of internal and external organizational decision components on the final price of industrial products with a factor-based approach

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Abstract

The aim of the current research is to provide a model to explain the effect of internal and external organizational decision components on the cost price of industrial products with a factor-based approach. The research method is applicable in terms of its purpose, and, a kind of qualitative and quantitative research of an exploratory type in terms of the process. The statistical population of the research is all experts and informants of the cost price of industrial products, and 35 people were determined as the sample size by the snowball sampling method. Companies' databases such as data related to industrial production and product pricing were used to collect data. Three methods of theme analysis, Delphi technique and factor-based model were used to analyze the data. The software used for the Delphi technique was SPSS version 25, and Netlogo software was used for the implementation and simulation of the factor-based model and its validation. The findings show that the changes in each factor during the period under review have an effect on other factors in the final price, and at the end, the validity of the model was confirmed by the experts. Therefore, the integration of the theory of constraints with factor-based modeling can be used as an effective tool in the cost price of manufactured products, and by means of it, the appropriate selling price of products can be determined and predicted in the short and long term periods.

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Extended Abstract

Introduction

From a long time ago, information has been very important in the process of conscious and enlightened human decision-making. With the development of societies, the importance of information in decision-making has increased. Today, information is considered as one of the important indicators of the strength of societies and their sustainable development. Accounting is a process that creates financial information, and in all economic units, an important part of decisions is made based on this information. Currently, accounting knowledge has become a comprehensive knowledge that many feel themselves obliged to know (Wu & et al, 2023). The need for accounting information has grown significantly in recent years. This growth has been due to the decrease in the cost of using computers as well as the increase in the use of scientific and complex methods for planning and decision making. Therefore, managers need more than ever the detailed accounting information, especially information related to the cost price. This growing need for accounting information is to meet internal organizational needs and also prepare financial reports for interest groups outside the business unit (Bloze, 2022).

In order to achieve this goal, managers must have accurate and timely information about the limitations in the system, the cost price of each product, and the available solutions for the optimal use of these limitations. Management accounting as a system must provide this information for managers (Hook, 2022). The traditional management accounting system and the developments in it, such as activity-based costing as well as the theory of constraints solutions, have been able to provide the aforementioned information well (Seyedy & et al, 2021).

One of the most flexible modeling methods is factor-based or factor-oriented modeling. The basis of naming this method is because the agents play an essential role in the model. In this type of modeling, each of the real world agents play a role as decision-making and fully automatic entities called model agents. In this regard, the aim of the current research is to answer this main question: what is the presentation of the simulation model of internal and external organizational decision components in improving the cost price of industrial products based on the factor-based approach?

Theoretical Framework

Internal decisions

Internal decisions in every organization are prepared by the senior managers of the organization periodically, often monthly. These reports are prepared on the way the organization works, including the cost price of products, material consumption, purchase reports and other important reports on industry and production trends. Intra-organizational decisions can be considered as types of management reports; because these reports are presented to the managers for detailed analysis and financial performance of the organization. (Junner, 2010)

External decisions

Extra-organizational decisions mean a type of report that is exposed to the observation of others after the approval and review of the organization's managers. These reports examine the financial conditions of the organization in general. Reports such as financial statements, profit and loss, balance sheet, etc. are such reports that generally examine financial accounts. These reports are not entered with the details of the smaller parts of the organization such as production and materials, etc. (Liang, 2019).

The cost price of industrial production

Manufacturing/industrial/commercial companies usually have many side costs that have a significant impact on the process of determining the price of a product. In other words, organizations have direct and indirect costs that can affect the cost price of products. Cost price accounting (cost accounting) is the process of collecting information about the costs incurred by a company's activities. Cost price accounting is a type of management accounting whose purpose is to calculate the total production costs of a company by evaluating the variable costs of each stage of production as well as fixed costs (such as rental costs) and is necessary to maintain a stable level of profit in the short and long term. North, 2019)

Factor-based simulation model

One of the most flexible modeling methods is factor-based modeling. The basis of naming this method is because the agents play an essential role in the model. In this type of modeling, each of the agents of the real world is called a model agent as a fully automatic decision-making entity. Each of these agents has various parts to understand the environment, analyze it, and finally take action. In fact, in factor-based modeling, the decision-making process in the real world is tried to be simulated by similar factors. (Hader, 2018)

Research methodology

According to the goals it pursues, the present research is a type of applicable research, and in terms of the process of conducting research places in the field of qualitative and field research, of an exploratory type. The statistical population of the research is all experts and informants of the cost price of industrial products, selected by the snowball sample. The experts' criteria included having a management experience in cost accounting for more than 5 years, and having a master's degree or higher. In this research, 10 people were determined as the sample size. In order to collect data from the companies' databases, data related to industrial products and their pricing were extracted to check the research objectives. Three methods of theme analysis, Delphi technique, and factor-based model were used to analyze the data. Netlogo software was used to implement and simulate the agent-based model and validate it.

Research findings

The findings show that during different years from 2022 to 2024, any changes in endogenous and exogenous variables have a direct relationship with each other; and the cost price also decreases and increases with the decrease and increase of these costs. The behavior of agents during different changes in the final price of products shows fluctuations.

Based on the findings, it can be stated that the endogenous variables are: marketing, advertising, distribution and sales, transportation, manpower, construction overhead, investment, profit, volume and number of sales, pricing, depreciation cost, production capacity, consumed energy, and quantitative discounts; and also exogenous variables include: technology level, inflation, taxes and tolls, market competition, exchange rate, bank interest rate, possible license fees, union rules and regulations, import and export amount, market demand, price of energy carriers, price of raw materials, nature of the market, price of competitors, boom or bust of the market, price elasticity, and substitute goods. Cost accounting information is designed for managers.

These findings are in agreement with the research results of Omran (2020) and Over & et al (2021) in the components of construction overhead, investment, profit; of Jamz & Kolz (2021) and Rota & Soza (2021) in the price components and depreciation costs, of Seyedy & et al (2021) in the price components of energy carriers, and the price of raw materials, and of

Kadim & et al (2020) and Paro & et al (2019) in the price components of competitors, the boom or bust of the market.

Conclusion

According to the findings of the research, the following suggestions can be made:

- 1- It is suggested to gather information about competitors and inter-task coordination by monitoring as much as possible, and by analyzing the strengths and weaknesses of competitors, they will become more profitable and, as a result, perform better.
- 2- Cost reduction will not be possible except by redesigning the product. In this technique, before the production stage, attention is paid to cost management to produce a product with a predetermined cost price and at the same time provide the desired profit of the management.
- 3- In costing, first the price is determined based on market analysis, and then the cost price of the product is determined according to the expected profit of the company.
- 4- Determining the selling price of products should be variable according to the amount of customers' orders to help increase the profitability of the company while being competitive
- 5- Establishing a strategic supply chain with raw material suppliers will reduce the initial production costs and ultimately reduce the cost price.
- 6- Creating an integrated software enable to connect all the separate softwares together and prevent the entry of new and parallel information has a significant effect on increasing the precision and accuracy of cost price calculations in the industry.

Researchers can also use other methods to model and compare the results, such as fuzzy dynamic systems, structural and interpretive modeling, simulation algorithms, dynamic non-cooperative game theory, etc.