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Does Applying Financial Engineering Methods Have an Impact on Improving Production Efficiency?

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ABSTRACT

The study aims to identify the application of financial engineering methods and production efficiency in the General Fertilizer Manufacturing Company in Basra. To obtain the required information, a sample of (250) workers working at various administrative and production levels in the company was selected as a study population. The questionnaire was used as a main tool for collecting data, and to test the study hypotheses: There is a significant effect of the processes of applying financial engineering methods in improving production efficiency. To measure the effect, analyze correlations, and then arrive at the research results, the two statistical programs (SMART PLS) were used. The research reached a number of conclusions, most notably the existence of an impact of the processes of applying financial engineering methods on the factors influencing the improvement of production efficiency. The study concluded with a number of recommendations, including the necessity of applying financial engineering methods in the company in the study population to improve production efficiency.

Keywords: financial engineering methods, production efficiency, the General Company for Fertilizers Manufacturing in Basra.

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INTRODUCTION

The application of financial engineering methods is one of the modern topics that researchers and writers have been interested in, and this interest is primarily focused on institutional and practical systematic treatments for how to develop and improve production efficiency (Dwivedi et al., 2021). Countries that seek to achieve efficiency and leadership in their economy and financial system have a financial environment based on financial engineering that will enhance financial liquidity, develop financial methods and tools, and create and innovate new systems that contribute to the modernization of financial services (Brummer, 2014). Contemporary global experience has proven the results of the changes taking place in the business management environment **(**Kumar, 2020). Moreover, It cannot give positive results without absorbing and using new knowledge in the methodology of management systems, whether at the level of business organizations or at the level of organizations as a whole (Alerasoul et al., 2022). So, attention must be paid to applying financial engineering methods and operations, in addition to the importance of production and productivity in our current era, and based on the above, I have discussed The researchers have four sections: the first section is the methodology of the study, the second section includes the theoretical framework of applying financial engineering methods and improving production efficiency, the third section includes the practical aspect, and then the fourth section includes conclusions and recommendations.

PROBLEM OF THE STUDY

The problems that the government sector suffers from represent an obstacle to its development and ensuring its continued pursuit of developing and improving performance and benefiting from everything new to achieve adaptation to the requirements of the times and the internal and external challenges that information technology imposes on practical reality. The distinguished performance of governments is achieved by relying on strategies and policies. And innovative modern trends that contribute to developing performance and achieving excellence (Tseng et al., 2021).

The expansion of government activity also places a burden on accounting and financial thought in the necessity of searching for new financial methods and tools to produce appropriate accounting information to rationalize decisions (Alsaid, 2020). The problem of the study and its importance

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arise from the fact that it is one of the studies that examines the application of financial engineering methods and productive efficiency (relationship and impact) in fertilizer companies (Lyu et al., 2021). In addition to the importance of applying financial engineering methods to factors in improving production efficiency, it provides a basis for workers to guide themselves to improve work performance. Of course, this study examines the most important issues facing the fertilizer company and their significant impact on the work environment. Through the main question, the following questions emerge:

- What is the nature and type of correlation and impact between applying financial engineering methods and improving production efficiency in the researched company?

- To what extent does the application of financial engineering methods affect improving production efficiency in the researched company?

IMPORTANCE OF THE STUDY

- This study contributes to presenting some of the administrative literature that sought to frame the concept of applying financial engineering methods, as well as the concept of productivity, as it is one of the important topics that received and continues to receive great attention from those interested in administrative thought (Tamimi & Orbán, 2022).

- The research attempt to measure and diagnose the dimensions of applying financial engineering methods in improving production efficiency as it is one of the necessities that the researched company must measure and know in light of dynamic environments.

STUDY HYPOTHESES

The study seeks to test the following two main hypotheses:

-There is a significant impact relationship on the application of financial engineering methods in improving production efficiency.

-There is a significant correlation with the application of financial engineering methods to improve production efficiency.

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STUDY OBJECTIVE

-Testing the correlation between the application of financial engineering methods in improving production efficiency in the General Company for the Fertilizer Industry in Basra.

-Measuring the effect of applying financial engineering methods on improving production efficiency in the researched company.

-Providing a set of proposals and recommendations to the company regarding the application of financial engineering methods to improve production efficiency in the researched company.

Procedural plan for the study:

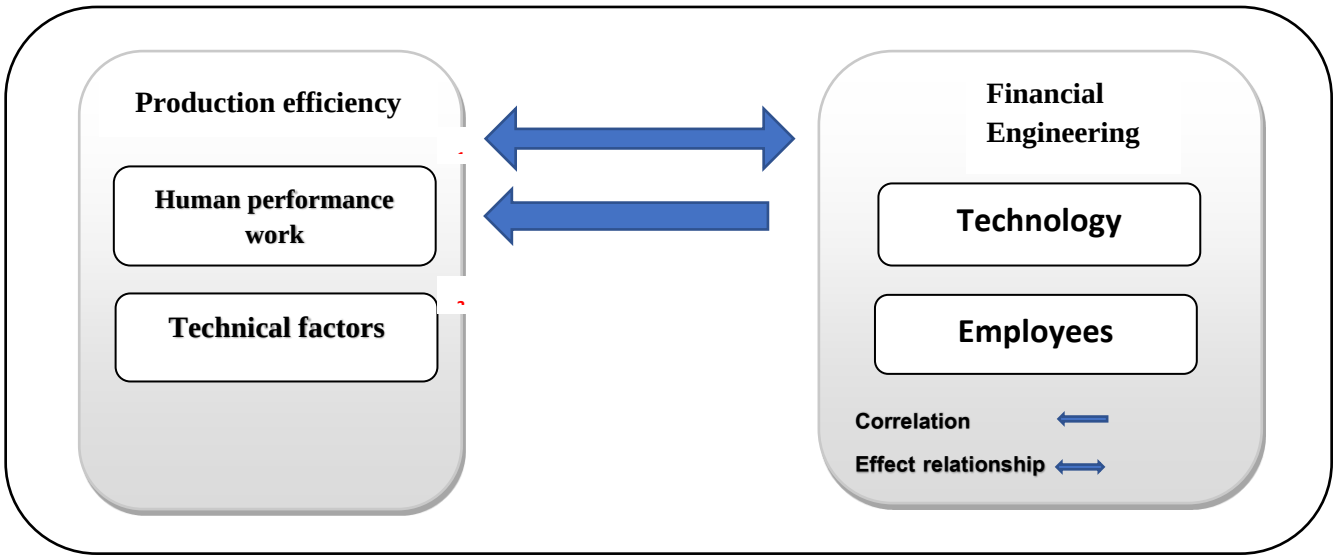

Figure 1: Hypothetical study diagram

Means of collecting data and information

The theoretical aspect: using references and sources available in libraries, including: books, studies, and letters.

The practical aspect: To measure the effect between the research variables and test the validity of the research hypothesis, the researchers relied on the questionnaire, which is the main means of

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collecting data, as its comprehensiveness and ability to diagnose the study variables were taken into account in its formulation.

The second section: The theoretical aspect of the study

Applying financial engineering methods

Financial engineering in the government sector - as one of the most important financial institutions: - Governments need a systematic input that is used to reach appropriate solutions to the problems they face by determining the nature of the problem to be solved, analyzing it, and finding solutions that include new tools, methods, or innovative systems that help solve the problem in the current system remains, that is, an attempt to manage the items of the financial position by providing modern and innovative solutions, tools and procedures, and providing new financing financial products (Mosteanu & Faccia, 2020), as financial engineering is known as the nucleus of the financial system of financial institutions, and a basic measure of the performance of financial entities. There have been many researchers' views on developing the concept of engineering. Finance to include many disciplines and intellectual activities that contribute to designing work in a rational and practical manner and provide models, theories, programs and financial products that serve financial institutions (OECD, 2021).

It is the process of final conversion of a financial product to improve its revenues or reduce its risks, which makes it play a role in changing market conditions (Hasan et al., 2020) Another definition of financial engineering: It is the application of common mathematical tools for use in physics and engineering to financial issues, especially pricing and hedging processes, and derivative financial instruments (Babarinde, 2020) as defined by him. It is the science that provides the methodological framework required to design appropriate techniques for managing financial risks that include asset and liability management, insurance policies, and hedging strategies.

Dimensions of applying financial engineering methods

Technology

Technology is an integral part of any re-engineering effort, as it contributes greatly to making tasks easier, in addition to redesigning organizations, changing ways of working, and achieving amazing and exciting improvements (Maharmah & Al Jbour, 2023). Technology helps change by enabling

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organizations to break the rules. traditional, which gives innovative organizations the opportunity to have a competitive advantage (Zhang et al., 2021).

Staff

Empowering the importance of human resources within the organization, in its ability to mobilize other resources and direct them towards the organization's goal. Ensuring that the organization's resources are used effectively can only be done by individuals. Likewise, the existence of the organization and its continuity or demise is linked to the quality and behavior of the individuals employed by the organization. In order for the organization to ensure its survival, it must employ Competent and highly skilled people and managing them effectively," and achieving the effectiveness of human resources can only be achieved by placing the right person in the right place and at the right time to accomplish his work (Alnuaimi et al., 2021).

Production efficiency

The concept of productive efficiency: Productivity is the ability to create output (outputs) using specific elements during a specific period of time. It is also defined as the proper use or exploitation of resources (Nodin et al., 2022), and, it is also known as the quantity of production (outputs) attributed to each element of production, as it the ratio of outputs to inputs (Lankoski & Thiem, 2020). Production efficiency is an expression of the conformity of actual productivity with its standard productivity(Adeodu et al., 2021).

Factors for improving production efficiency

Given the important role of productivity in economic and social development, it is difficult to determine the factors affecting it. Therefore, many researchers and specialists have studied and analyzed its determinants at the macro and micro levels, relying on the fact that: previous knowledge of the factors affecting the improvement of productive efficiency and precise knowledge of their various effects is a matter of It is indispensable if I want to achieve any improvement in the level and rate of productivity growth (Felsberger et al., 2022). Another characteristic of productivity factors is that they are of a reciprocal and intertwined nature, meaning that the degree of this relationship varies according to the circumstances, levels of production, and fields or branches of their application. It can be said that there is no classification. The factors of

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productivity are unified, but researchers, administrators, and thinkers differed in the way and method of classifying these factors. Some of them grouped these factors according to the three elements of production (means of work, materials of work, labor force). And some of them grouped them according to the nature or characteristic of each factor (social factors, factors Economic, technological and human.

Dimensions of production efficiency

-Human performance of work: These factors are related to the ability to work and the desire to perform, as the productive efficiency of the worker is closely related to the human effort because he has a major role in performing the work. (Schelble et al., 2023)

-Technical factors: These factors depend on the quality and quantity of materials, the level of customer preparation, as well as the raw materials used in the work and job design. Administrative factors must also be available, such as planning, organization and control, which inevitably affects productivity. The better the administrative factors are, the more they will inevitably lead to To increase productivity and vice versa. Weak planning and organization and poor decisions making will lead to adverse results represented by decreased productivity (Wang et al., 2020).

The practical side

After the necessary tests were conducted to ensure the quality of the data collected, the amount of influence between the variables of the study will be identified, as the study aimed to reduce negative and bad practices in a toxic work environment through their influence on wise leadership in educational institutions. In order to test the impact hypotheses, the application program (SMART PLS) will be used. In the beginning, for each hypothesis, the relationship between the study variables will be tested, then the extent to which the independent variable (application of financial engineering methods) explains the variance occurring in the dependent variable (productive efficiency) will be identified, then the influence factor between the study variables will be estimated, as it was assumed Two main hypotheses are as follows -:

First: The first main hypothesis: The researchers assumed that there is a significant and positive influence relationship on the application of financial engineering methods on productive efficiency. This assumes that the application of financial engineering methods is a true function of

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productive efficiency and that any increase in (the independent variable) will lead to a similar decrease in (the dependent variable). The structural equation will be tested (SEM-PLS), and the results will be extracted through the statistical program (SMART PLS). According to the simple regression method, the effect factor (Beta) and the level of significance that appear on the arrow connecting the independent variable to the dependent variable are estimated as shown in the figure (2) and the table (1). They are as follows:

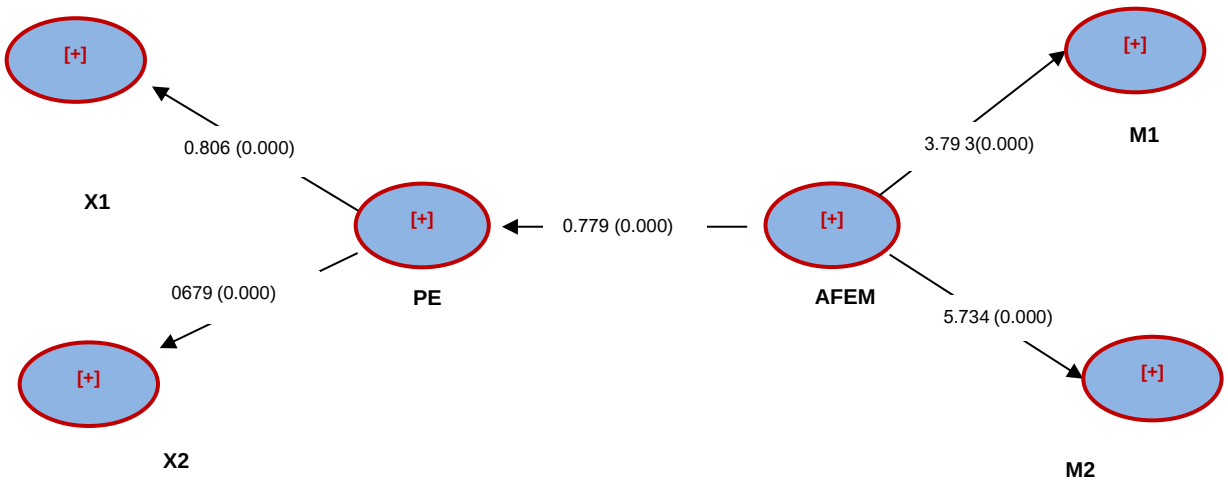

Figure 2: The results of the simple regression analysis test, applying financial engineering methods to production efficiency.

Table 1: *Statistics of the impact factor test, applying financial engineering methods to production efficiency.*

	Original Sample (O)	R	Standard Deviation (STDEV)	R^2	T Statistics (|O/STDEV|)	P Values
AFEM -> PE	0.798	0.810	0.095	0.62	8.4	0.000

According to the results of table (1), it became clear that there is an influence relationship between the application of financial engineering methods and production efficiency. It reached (0.810), which is positive and acceptable at a significance level (0.05). As it became clear from table (1), the coefficient of determination (R2) reached (0.62), which indicates that the application of

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financial engineering methods explains an amount of (0.62) of the variance occurring in the dependent variable, the production efficiency environment.. As for the amount of effect, it reached (0.798). That is, any increase in the independent variable, applying financial engineering methods, will lead to a decrease in the production efficiency environment by (0.798). It is significant at a significance level of (0.05). According to these results, this hypothesis is accepted at the level of this study.

Second: The second main hypothesis: The researchers assumed that there is a significant correlation between the application of financial engineering methods and productive efficiency. This assumes that the application of financial engineering methods. It is a real function of productive efficiency, and any increase in (the independent variable) will lead to a similar increase in (the dependent variable). The structural equation will be tested (SEM-PLS), and the results are extracted through the statistical program (SMART PLS) according to (the simple regression method). It estimates the effect factor (Beta) and the level of significance that appears on the arrow connecting the independent variable to the dependent variable, as shown in the figure (3) and the table (2). They are as follows:

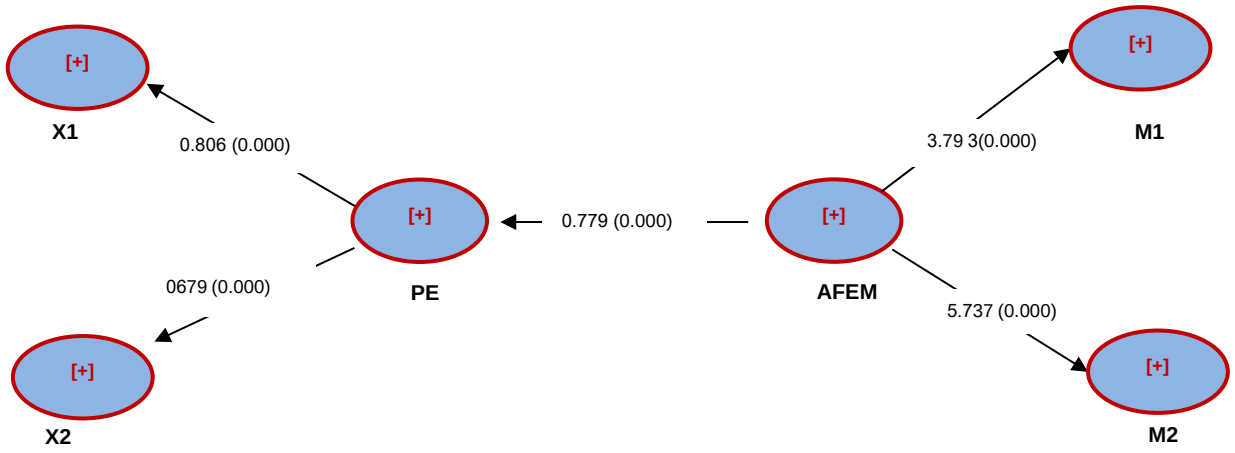

Figure 3: The results of the simple regression analysis test, applying financial engineering methods to production efficiency.

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Table 2: *Statistics of the impact factor test on the application of financial engineering methods in production efficiency*

	Original Sample (O)	R	Standard Deviation (STDEV)	R^2	T Statistics (|O/STDEV|)	P Values
AFEM -> PE	-0.613	-0.648	0.079	0.44	-7.76	0.000

According to the results of Table (2), it became clear that there is a correlation between the application of financial engineering methods and production efficiency. It reached (0.648), which is positive and acceptable at a significant level (0.05). It is also clear from the table (3) that the coefficient of determination (R2) reached (0.44), which indicates that the application of financial engineering methods explains (0.44) of the variance occurring in the variable toxic work environment. As for the amount of effect, the figure (3) showed The impact factor reached (0.613), meaning that any increase in the variable applying financial engineering methods will lead to an increase of (0.613) in production efficiency. It is significant at a significance level of (0.05). According to these results, this hypothesis is accepted at the level of this study.

CONCLUSIONS

Financial engineering is a multi-dimensional art that involves the formulation of innovative solutions for improving information systems and databases, with the aim of enhancing productivity and efficiency of a company. It is a source of innovation for financing tools and modern financial products, which satisfy the needs of financial institutions and improve their efficiency. The application of financial engineering methods plays a crucial role in achieving productive efficiency. Recent research has demonstrated a direct correlation between the use of financial engineering methods and the enhancement of production efficiency in the company. The more financial engineering methods are utilized, the greater the success in improving production efficiency. In recent years, several modern financial engineering techniques have emerged that have helped to reduce the risk rate. These techniques have created and developed new financial instruments and organized them with specific combinations, leading to the identification of centers of power that can further improve production efficiency. To begin with, it is essential to pay attention to the continuous application of financial engineering methods. This is because these methods play a crucial role in effectively contributing to the successful application of factors that

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can help improve production efficiency. Moreover, the company needs to utilize advanced technology to carry out the necessary work. It is also important to involve employees in decision-making related to the application of financial engineering methods and operations. Additionally, it is possible to use financial engineering as a tool to provide the company with hedging technology. This can help the company absorb shocks better during times of crisis.

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