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Evaluation of Pharmaceutical Companies Introduced in Tehran Stock Exchange Using Balanced Scorecard Method and Data Envelopment Analysis

Fatemeh Sadat Aghaei [1], Majid Annabi *[2]

1. *Department of Pharmacoeconomics, Faulty of Pharmacy, Tehran Medical Sciences, Islamic Azad university, Tehran, Iran.*
2. *Department of Pharmacoeconomics, Faulty of Pharmacy, Tehran Medical Sciences, Islamic Azad university, Tehran, Iran.* **** Corresponding Author:*** *m.annabi@iautmu.ac.ir*

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ABSTRACT

Background: Pharmaceutical science is one of the most dynamic scientific fields in the production of new science and technology due to its tremendous impact on improving health. Techniques such as DEA (data envelopment analysis) and BSC (balanced scorecard) are tools that cannot be considered alternative techniques. The main purpose of this study is to evaluate the efficiency of pharmaceutical companies introduced in the Tehran Stock Exchange based on the model Balanced Scorecard, and using data envelopment analysis.

Methods: In the beginning, performance evaluation indicators from four perspectives: financial, customer, internal processes, and learning and growth; then the efficiency of these companies is considered based on the indicators considered in the model (BSC), measured using (DEA). The statistical population of this study consisted of 13 pharmaceutical companies operating in Iran and listed on the Tehran Stock Exchange. After collecting data, the efficiency rating of pharmaceutical companies was calculated using the output-driven CCR model. This model has been implemented using DEA-Solver software.

Results: The results of the model implementation include efficiency scores for each decision unit. As a result, companies that have a rating of 1 are effective. Others are considered ineffective. The results show that out of the 13 pharmaceutical companies surveyed, 9 companies are effective and the rest are ineffective.

Conclusion: As a result, companies that have a score of 1 are efficient and compared to other units, they have relatively better used their resources and obtained better results.

Keywords: Pharmaceutical Science, Efficiency, Tehran Stock Exchange, Data Envelopment Analysis (DEA), Balanced Scorecard (BSC).

Introduction

Pharmaceutical science is one of the most dynamic scientific fields in the production of new science and technology due to its tremendous impact on improving the health indicators of individuals and societies. This science is increasingly dependent on other knowledge such as management knowledge, economics, and information technology in various fields. Productivity and efficiency in its broad and broad sense have long been of interest to humans. [1]

On the one hand, man's desires and wishes are unlimited, and on the other hand, his ability, strength, facilities, tools and lifetime are limited. Using basic and advanced techniques to achieve better performance can be one of the most important tools to improve performance. The meaning of productivity is the extent to which goals and plans are achieved efficiently and resources are used optimally. The performance evaluation system can be considered a systematic process of measuring, measuring, and comparing the amount and manner of achieving the desired situation; In other words, it is a comparison between what exists and what is desirable.

In this study, which is an experience of applying the integrated model of balanced scorecard and data envelopment analysis to evaluate the efficiency of pharmaceutical companies introduced in the Tehran Stock Exchange, in the beginning, performance evaluation indicators and their measurement from four perspectives: financial, customer, internal processes and learning and growth; and then the efficiency of these branches is considered based on the indicators considered in Balanced scorecard model, measured using data envelopment analysis.[2]

Experimental:

❖ Performance management

The literature related to performance evaluation has two stages. In the first stage, which lasted until the 1980s, the focus of performance measurement was on the financial criteria provided by the management accounting system, and the second stage began in the late 1980s and is still progressing. [3]

Performance management is the concept of information analysis to make effective decisions and improve the organization's performance. [4]

In this model, three stages of performance evaluation are considered: [5]

1. Performance planning: including determining performance goals at different levels, identifying the necessary activities to achieve expected results, and performing appropriate organization by analyzing jobs and enabling systems to determine different components and requirements for performance planning.

2. Performance Evaluation: Refers to a set of actions and activities that are performed to increase the level of optimal use of facilities and resources to achieve economic goals and methods with efficiency and effectiveness. [6]

3. Performance Improvement (Organizational Improvement): Performance improvement at the organizational level leads to improvement of the whole organization. Organizational improvement is knowledge that is based on behavioral and applied sciences and has a view of the whole organization. [7]

The course of the performance management transformation can be divided into three phases:

1. 1850-1925: Development of Cost Accounting and Management
2. 1974-1992: Development of Multidimensional Performance Measurement Frameworks
3. 1992-2000: Development of strategy maps, business models, or cause and effect diagrams

In the past, performance management focused on finances. Traditional (financial) scales do not fully coincide with the competencies and skills of companies that are required facing today's workplace. In addition, these traditional scales tend to focus on the person or the performance, not on the processes that are at the center of management. [8]

In this way, many criticisms were made of the traditional performance management systems, which led to the creation of new performance evaluation systems. These new systems, such as balanced evaluation, Malcolm Baldrige method, performance excellence model, data envelopment analysis technique, etc., overcome the major weaknesses of traditional evaluation systems. [9]

The table (1) summarizes the difference between the two perspectives of modern and traditional performance.

Table 1. The difference between the two perspectives of modern and traditional performance

Features	Traditional perspective	Modern perspective
Evaluator's role	Performance appraisal and measurement	Performance consultant and facilitator
Evaluation period	Past	Feature
Evaluation standard	The organization's and senior management's opinion	Self-standardization
The main goal of the evaluation	Control of assessable evaluation	Growth, guidance, and development of evaluation capacity
System output	Performance control	Growth, development, and performance improvement
Evaluation outcomes	Identifying and recognizing the most successful and providing financial rewards to managers	Providing consulting services for continuous improvement of daily activities (creating continuous motivation for improving the quality of services and activities
Post-evaluation interview style	A formal legal process similar to a trial	Conversation

The most important methods and models in evaluating the performance of organizations are: [1] 0

- Organizational Self-Assessment Patterns:
  - European model of performance excellence
  - Deming Performance Excellence System
  - Malcolm Baldridge model
  - Efficiency and Effectiveness Measurement Model
  - Benchmarking pattern
  - Balanced scorecard pattern
  - Data Envelope Analytical Pattern
- Organizational Performance Triangle Pattern
- Customer-oriented strategic planning model

Performance management goals can be categorized into six general objectives:

1. Alignment of strategies and activities
2. Operational control
3. Management and interaction with stakeholders
4. Awareness of reasons for quality improvement or decline
5. Motivation and reward for employees
6. Accountability

❖ Efficiency

Effectiveness means how well an organization has been able to achieve its goals and how it has acted based on the purpose it has set to achieve the goals. [1]

Efficiency refers to the notion that an organization has made good use of its resources towards production towards the best performance at some point in time. The calculation of efficiency according to the expected or standard output value is defined using the following ratio:

$$Efficiency = \frac{Output\ Power}{Input\ Power}$$

$$= \frac{Output\ Power}{Output\ Power + Losses} \quad or$$

$$= \frac{Input\ Power - Losses}{Input\ Power}$$

❖ Balanced Scorecard

In the early 1990s, Robert Kaplan, a professor at Harvard Business School, along with David Norton, initiated a research project to examine the reasons for the success of twelve top American companies and study the performance evaluation methods used in these companies. The result of this research was published in an article titled "The Measures That Drive Performance" in January 1992. The article mentioned that successful companies do not rely solely on financial indicators for performance evaluation, but rather, to conduct a comprehensive evaluation of organizational

performance, it is necessary to assess performance from four perspectives:

1. Financial perspective
2. Customer perspective
3. Internal process perspective
4. Learning and growth perspective

Kaplan and Norton summarized their experiences in advising these organizations in a book titled "Balanced Scorecard," which was published in 1996. Thus, the Balanced Scorecard was introduced not only as a powerful tool for performance evaluation but also as a tool for achieving strategy. [1]

Balanced Scorecard reflects the balance between short-term and long-term goals, financial and non-financial indicators, leading and lagging indicators, and internal and external performance aspects. In other words, the Balanced Scorecard is a multidimensional framework that uses measurement as a tool to articulate an organization's strategy. [1]

This framework examines organizational performance from four key aspects, which are mentioned below:

- Financial: emphasizes shareholder satisfaction, key indicators, and goals in the financial aspect, mainly profitability (net and/or gross), return on capital, surplus income, added economic value, sales growth, position and market share, and circulation of funds.
- Customer: Emphasizes customer satisfaction, the goals and key indicators of this aspect emphasize customer concerns such as delivery time, quality, service, and cost.
- Internal processes: the objectives and key indicators of this aspect should emphasize the important competencies and skills, processes, and technologies that guarantee the (financial/customer) success of the present and future of the organization.
- Growth and learning: It emphasizes three other aspects, long-term goals, and key indicators in this aspect are related to improving flexibility and investing in future development and new opportunities. [1]

The success of the balanced scorecard is based on the assumption that all four perspectives are interconnected through a cause-and-effect relationship. The cause-and-effect logic, as the essence of the balanced scorecard approach, distinguishes it from other approaches. [1] The figure below illustrates the cause-and-effect relationship existing in these four perspectives.

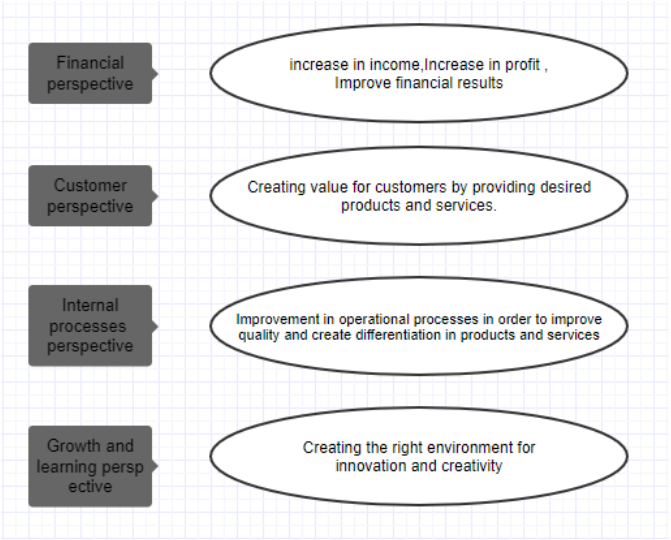

Figure 1. Cause and effect relationship in 4 perspectives of balanced scorecard

❖ **Data Envelopment Analysis**

The history of data envelopment analysis dates back to Rhodes's PhD thesis guided by Professor Cooper. They developed their model from Farrell's perspective. Using a method similar to measuring efficiency in engineering topics, Farrell attempted to measure efficiency for the unit of production.

Charnes, Cooper, and Rhodes developed Farrell's view, which was to measure efficiency with one input and output, and presented a model that could measure efficiency with multiple inputs and outputs. This model was called Data Envelopment Analysis.

In their article, they described the DEA as follows:

"Data Envelopment Analysis is a mathematical planning model applied to observed data that provides a new method for empirically estimating weighted ratios or efficiency limits such as the production function that underlines modern economics".

Data envelopment analysis is a planning technique that calculates the relative

efficiency of several decision-making units based on observed inputs and outputs that may be expressed with a variety of different scales.

The concept of decision-making units (DMU) refers to an organizational unit or a separate organization that is managed by an individual called a manager, director, or department head, provided that this organization or organizational unit has a systematic process, meaning that several production factors are employed to produce several products.

Data envelopment analysis is based on a series of optimization using linear programming and its function type is not predetermined, so its parameters need to be estimated, therefore this method is called "nonparametric". [1]

Parametric methods use a desired mathematical form, while data envelopment analysis provides a clear and distinct understanding of different decision-making units. In nonparametric methods, without considering any assumptions for the production function, an empirical production function is constructed. Since the production function is not available, a set of empirical production possibilities is created through a series of observations, and the boundary resulting from this set is an empirical production function derived from observations or an efficiency frontier. In other words, by combining all the units under consideration, an imaginary unit with the highest efficiency is created and the inefficient units are measured against it. The efficiency obtained in data envelopment analysis is relative, and the efficiency frontier is created by a combination of efficient units.

The efficiency obtained in the data envelopment analysis method is relative and the efficiency boundary is created by a combination of efficient units. Therefore, any decision-making unit that is on the above border is efficient, and otherwise, it will be ineffective. It is worth mentioning that after the implementation of data envelopment analysis models, a set is presented under the title of the reference set. In this collection, it is specified that each inefficient unit should be compared with which of the efficient units to reach the efficiency limit. [1]

Each organization has n decision-making units (DMUj) with m inputs and s outputs; So:

The 'i' input amount for the 'j' unit xij (i=1,2,3,……,m

The 'r' output amount for the 'j' unit yrj (r=1,2,3,……,s

in this case

$$\text{Efficiency} = \frac{\text{weighted sum of outputs}}{\text{weighted sum of inputs}} = \frac{u_1 y_{1j} + u_2 y_{2j} + \dots}{v_1 x_{1j} + v_2 x_{2j} + \dots}$$

In the above formula, Ur is the weight of the 'r' output and Vi is the weight of the 'i' input. To use the data envelopment analysis technique and evaluate each of the decision-making units, a linear programming model should be built, and based on that, the relative efficiency of each DMU should be compared with each other.

Therefore, according to the number of decision-making units, a linear programming model should be built, and from their solution, the relative efficiency (Ej) of each unit is determined. According to this formula, it is clear that there should be a common set of weights for all units.

In practice, it is difficult to determine these joint weights of work. The first problem is that it is not easy to value Input and output. The second problem is that different units organize their operations in different forms. Therefore, the value they give to different data and ratings will differ from others. Therefore, to avoid weighting or assigning any relative priority to data or representations, we propose the following definition of relative efficiency:

A DMU is 100% efficient based on the available evidence if and only if the performance of the other DMUs does not show that some inputs or outputs of that unit can be improved and at the same time other inputs and outputs of that unit do not deteriorate. [1]

When evaluating comparative producers, the first methodological issue that should be considered is "returns to scale". If the returns to scale are constant (CRS), it means that increasing one unit of input leads to an increase of one unit of output, and efficiency does not change with changes in production volume. Therefore, if a production technology has variable returns to scale (VRS), it indicates that the volume of production has an impact on efficiency, and it can be concluded

that some existing inefficiencies are due to suboptimal production volume.

The use of the data envelopment analysis model for evaluating units requires determining two essential characteristics: the nature of the pattern and its scale efficiency, which are explained below.

- The nature of the model used
  - ✓ The nature of input-oriented: If we try to minimize the inputs by keeping the level of outputs constant in the evaluation process, the nature of the model used is input-oriented.
  - ✓ Output-oriented nature: If we try to increase the output level by keeping the level of inputs constant in the evaluation process, the nature of the model used is output-oriented.
- Returns to scale, the model used returns to scale, represents the link between changes in inputs and outputs of a system. One of the capabilities of the data coverage analysis model is the application of different models, corresponding to the efficiency of different scales, as well as the measurement of efficiency to the scale of units.
  - ✓ Constant Returns to Scale: Constant returns to scale means that any multiple inputs will produce the same multiple outputs.
  - ✓ Variable Returns to Scale: Variable returns to scale mean that any multiple of inputs will produce a multiple of outputs that is less than or greater than that.

Although the number of data envelopment analysis models has increased and become more specialized, they are all based on several main models that have been designed and explained by the founders of this scientific method.

Multiaxial CCR Output Axis Model

1. In an input-oriented model, a unit is inefficient if it is possible to reduce each of the inputs without increasing the other inputs or reducing each of the outputs.
2. In an output-axis model, a unit is inefficient if it is possible to increase each of the outputs without increasing one input or decreasing each of the outputs.

A single unit will work if and only if neither of the above two things is fulfilled.

The multiple (initial) model of the CCR output axis is model 1:

$$MinZ_0 = \sum_{i=1}^{m} v_i\, x_{i0}$$

$$S.t:$$

$$\sum_{r=1}^{s} u_r y_{r0} = 1$$

$$\sum_{r=1}^{s} u_r y_{rj} - \sum_{i=1}^{m} v_i x_{ij} \le 0\ ; (j = 1,2, \dots\dots, n)$$

$$u_{r,} v_i \ge 0$$

Output-oriented CCR coverage model

If we assume that the variable corresponding to the first constraint of model 1 in the secondary problem is θ and λ_J is the variable corresponding to the other constraints of the initial model, the coverage model will be as follows:

$$MazZ_0 = \varphi$$

$$S.t:$$

$$\sum_{j=1}^{n} \lambda_j y_{rj} \ge \varphi y_{r0}\ ;\ \text{(r=1,2,……..,s)}$$

$$\sum_{j=1}^{n} \lambda_j x_{ij} \le x_{i0}\ ;\ (i = 1,2, \dots\dots, m)$$

$$\lambda_j \ge 0\ ;\ \varphi: Free\ ;\ (j = 1,2, \dots\dots, n)$$

The goal of the business model is the maximum output value. In this model, it is φ^*≥1, and 1/φ^* indicates the level of efficiency.

Combined model of DEA and balanced scorecard (DEA-BSC):

Techniques such as DEA and BSC are tools that cannot be considered alternative techniques. Rather, the combination of these two is considered in the performance evaluation system. The complementary structure of these two models is summarized in Table 2.

Table 2. Comparison of the complementary structure of DEA and BSC species

ABILITY	BSC	DEA
The method of measurement	Compare with a unit	Relative comparison
Structure	The ideal virtual unit	Homological unites
Mathematical principles	weak	Strong
Applied processes	Self-evaluation of the organization	Determination of technical efficiency
Measurement accuracy	Average	High
Ability to provide improvement solutions	Average	High
The possibility of ranking	Not possible	Possible
Planning	Has it	Doesn't have it
Organizational strategy	Has it	Doesn't have it

In the hybrid model, BSC is used as a tool for designing evaluation indicators, and DEA as a tool for evaluating relative efficiency and performance.

Methods

The present research is descriptive in terms of its objective and terms of degree of control of variables and uses library methods, references to documents and records, interviews, and questionnaires to collect data. In this research, the data from 12 months of 1401 was used.

To determine the indicators of the balanced scorecard, the research literature was reviewed and several indicators were collected, and then through interviews with experts, the adapted indicators of the balanced scorecard for pharmaceutical companies were identified and confirmed. In this regard, the indicator questionnaire Localized BSCs was designed.

The population of this study consisted of 13 active pharmaceutical companies in Iran listed on the Tehran Stock Exchange. The companies included in this research are Jaber Pharmaceutical Company, Iranian Injectable and Pharmaceutical Products Company, Tolid Darou Pharmaceutical Company, Zahrawi Pharmaceutical Company, Alborz Bulk Pharmaceutical Raw Materials Company, Razak Pharmaceutical Company, Rouz Darou Pharmaceutical Company, Shahid Ghazi Serum Manufacturing Company, Sina Darou Pharmaceutical Company, Iran Darou Pharmaceutical Company, Osve Pharmaceutical Company, Sobhan Oncology Pharmaceutical Company, and Pars Darou Pharmaceutical Company. The questionnaire was sent to these companies and a survey was conducted among their employees.

To assess the content validity, the questions of this questionnaire were reviewed by 10 experts in this field, and the final questionnaire questions all obtained a CVI coefficient above 0.7.

In this study, Cronbach's alpha coefficient method was used to determine the reliability of the employees' job satisfaction questionnaire. The Cronbach's alpha coefficient is 0.947 and since the alpha coefficient above 0.79 is desirable, therefore, the questionnaire has a good reliability.

This research has several phases presented in the form of flowchart (Figure 2).

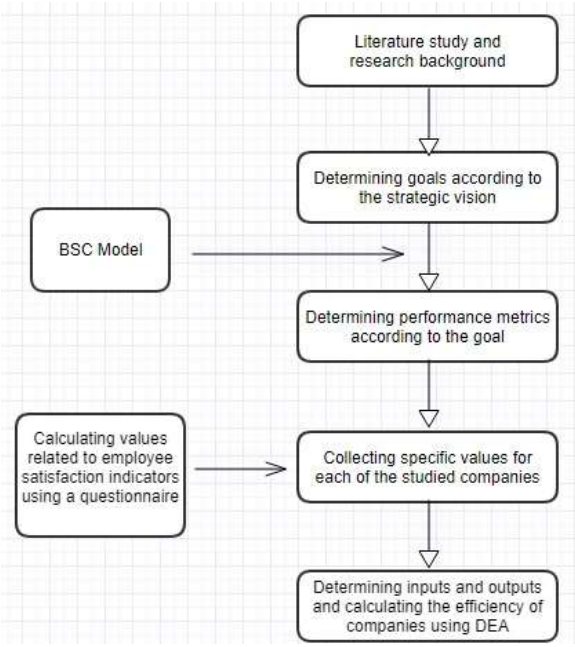

Figure 2. of the implementation steps of the research

Result and Discussion

The localized indicators of the balanced scorecard that are used in this research are in four dimensions corresponding to the main dimensions of the scorecard and the 16

criteria below are summarized as shown in Table (3).

Among the indicators of the balanced scorecard, job satisfaction, the amount of product complaints, total assets, current assets, employee absenteeism, and employee turnover are considered as input variables, and the rest of the indicators are considered as output of the model.

The obtained data were entered into SPSS software for preliminary analysis and the following charts were obtained for comparison:

Chart (1) is based on net profit and loss and the number of new products. Based on what can be seen from the graph, the maximum frequency of profit and loss is in the range of 0 to 500.00 million Rials, and also most of the investigated companies have introduced more than 5 new products in the last year and tried to and increase the diversity of their products.

The maximum frequency of the profit range is between 0 and 500,000 million Rials. This shows that a significant number of companies in this range can make a profit. Also, by examining this frequency, it can be seen that companies with a different range of new product production (from 1 to more than 10 products) are in the profit range of 0 to 500,000 million riyals. From this observation, it can be concluded that just focusing on the production of a new product does not automatically increase the net profit, and companies that have managed to earn more profit with more new products, probably use strategies to improve sales. They have considered reducing costs and improving their profitability.

Table 3. indicators of balanced scorecard

Growth and learning	Job satisfaction and employee satisfaction Number of new products per year Revenue from new products
Internal processes	Employee absenteeism Employee turnover rate
Customer	Market share The number of complaints about the product Monthly sales amount
Financial	Net profit margin Operating income Total assets Current assets Net profit and loss The ratio of income to the number of employees The ratio of cost to the number of employees Invested return rate

The highest profits are for companies that have introduced fewer new products. This shows that the focus of these companies has been on the production of profitable and high-efficiency products, which has been able to help increase profitability. In these companies, the production strategy has been to produce fewer products but with higher profits.

The most competition between companies is between companies with less than 5 new products and companies with more than 5 new products. Most companies that introduce more than 5 new products per year have an acceptable net profit. This shows that product diversity and the ability to develop and offer new products can help increase profitability. These companies can gain a new market and divide the old market with their new products, and this ability can be identified as a driving force for these companies in the coming years.

Chart (2) is based on net profit and loss and total assets. As mentioned, the maximum frequency of profit is in the range of 0-500,00 million riyals. The companies that are in this range also have the lowest amount of assets, which is 500,000-650,000 million riyals. It was also seen in the previous diagram that these companies have a wide range of new products (from 1 product to more than 10 products). From these two graphs, it can be concluded that having the same assets does not guarantee the profitability of new products by itself, and for the profitability of new products, a suitable strategy and roadmap are needed.

Companies with the most assets (1,230,00 — 1,800,00) also have high profitability. Likewise, these companies are companies that have presented more than 5 new products; therefore, it can be concluded that the ability to exploit assets and make optimal use of resources to produce and develop new products can lead to an increase in the profitability of companies. These companies have likely considered improving performance and optimizing their processes, which has led to the profitability of new products.

Companies with medium asset limit (650,000-1,000,000); have earned the most profit, which means having the best performance.

This means that these companies have reached high productivity with medium assets. These companies have been companies that have produced a small number of new products (less than 5 products) and have focused on profitable products.

From the sum of these two graphs, it can be concluded that by focusing on profitable and concentrated products and increasing the productivity of assets, it is possible to achieve the highest level of profitability.

Chart (3) is based on net profit and loss and profit margin. As it was said, the maximum frequency of profit and loss is in the range of 500,00 million Rials. It can be seen that most of the investigated companies have a profit margin between 25% and 35%. By putting these two variables together and comparing them, it can be concluded that companies with lower profit margins had lower net profits, and companies with higher profit margins had higher net profits.

Chart (4) is based on net profit and loss and return on capital. As it was said, the maximum frequency and loss is in the range of 500,00 million Rials, it can be seen that most of the investigated companies have a return rate of 10% to 50%. By putting these two variables together and comparing them, it can be concluded that companies with a lower rate of return on investment had lower net profit and companies with a higher rate of return on investment had more net profit.

After collecting the information related to the balanced scorecard indicators, the efficiency score of the pharmaceutical companies was calculated using the output-oriented CCR model. This model was implemented using DEA-Solver software. The considered pharmaceutical companies were calculated based on efficiency. were ranked for them, the results of which are given in table (4).

The results of running the model include the efficiency score for each decision-making unit. As a result, companies that have a score of 1 are efficient. This means that compared to the rest of the units, they have relatively better used their resources and obtained better results. Other companies that scored less than 1 are considered inefficient. The results show that among the 13 pharmaceutical companies investigated, 9 companies are efficient and the rest are ineffective.

In addition to the performance scores, data coverage analysis can determine a reference set of efficient companies for each inefficient company. Using this reference set, it is possible to determine the target values for the inputs and outputs of the inefficient company, according to which the inefficient companies can reach the level of efficiency In the appendix, the reference units for inefficient units to reach the relative efficiency limit and the coefficients of each of the reference units are shown in the output-oriented CCR method.

According to the coefficients of the reference units, virtual units will be created by combining the efficient units. The inputs and outputs of the virtual unit specify the desired inputs and outputs to reach the efficiency level of the inoperative units.

Chart (1) Net profit and loss and number of new products

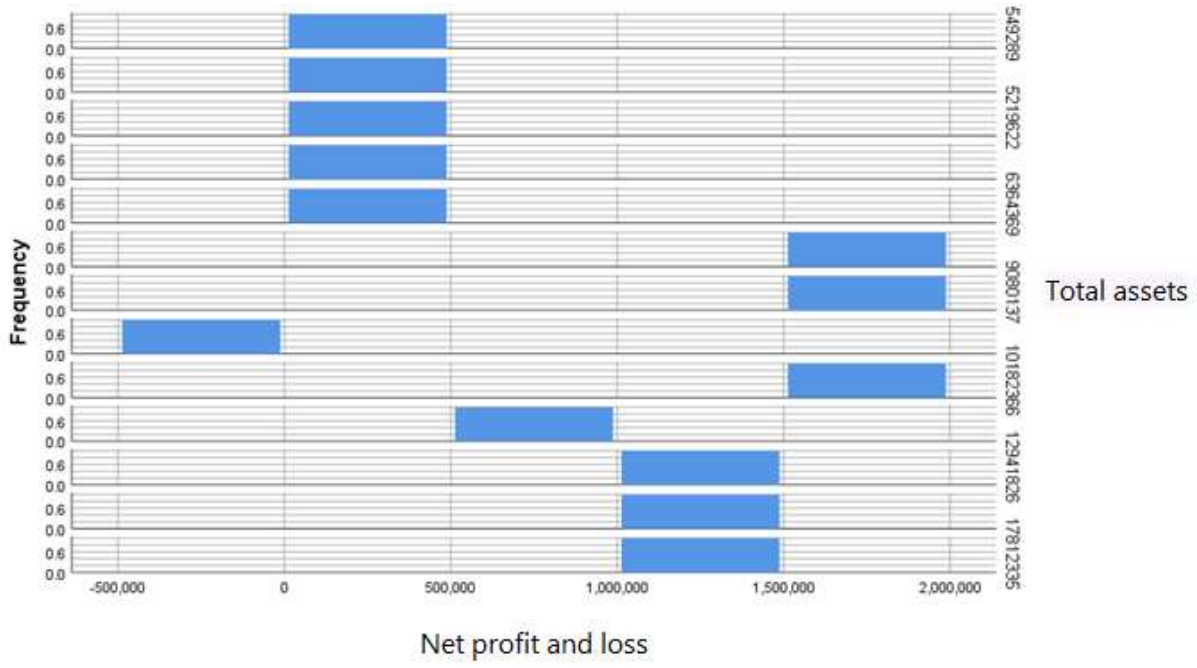

Chart (2) Net profit and loss and total assets

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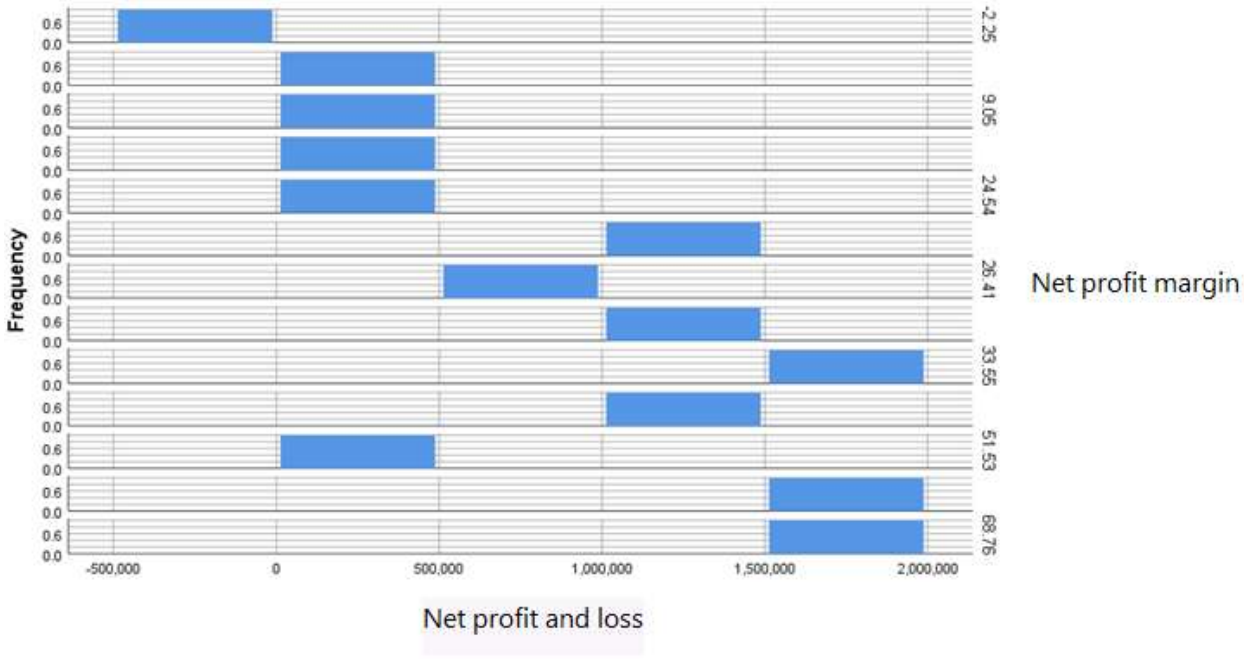

Chart (3) Net profit and loss and net profit margin

Chart (4) Net profit and loss and rate of return on investment

Table (4) results of efficiency of units

efficient	1	**Osve**
inefficient	0.716	**Iran Darou**
inefficient	0.958	**Pars Darou**

inefficient	0.897	**Tolid Darou**
efficient	1	**Jaber**
efficient	1	**Alborz Bulk**
efficient	1	**Iranian Injectable and Pharmaceutical Products**
efficient	1	**Razak**
efficient	1	**Rouz Darou**
inefficient	0.823	**Zahrawi**
efficient	1	**Sobhan Oncology**
efficient	1	**Sina Darou**
efficient	1	**Shahid Ghazi**

Conclusion

Regarding net profit and loss, the most frequent profit range is between 0 and 500,000 million. This suggests that a significant number of companies in this range can make a profit. Companies with a different scope of new product production are in this range, which means that focusing on new product production does not in itself increase net profit, and companies must consider strategies to improve sales, reduce costs, and improve profitability.

The most profits are attributable to companies that have offered fewer new products. The focus of these companies has been on producing profitable and high-yielding products that have been able to help increase profitability.

By examining the assets of companies, we concluded that the companies with the most assets (1,230,00 — 1,800,00) also have high profitability. Likewise, these companies are companies that have presented more than 5 new products; therefore, it can be concluded that the ability to exploit assets and make optimal use of resources to produce and develop new products can lead to an increase in the profitability of companies. These companies have likely considered improving performance and optimizing their processes, which has led to the profitability of new products.

Companies with medium asset limit (650,000-1,000,000); have earned the most profit, which means having the best performance. This means that these companies have reached high productivity with medium assets.

Finally, it can be concluded that by focusing on profitable and focused products and increasing the productivity of assets, the highest profitability can be achieved.

Most of the surveyed companies have a profit margin between 25% and 35%. Companies with higher net profit margins had higher net profits.

Most of the investigated companies have an investment return rate of 10% to 50%. Companies with a higher rate of return on investment have had a higher net profit.

The results of running the model include the efficiency score for each decision-making unit. As a result, companies that have a score of 1 are efficient. This means that compared to other units, they have relatively better used their resources and obtained better results. Other companies that scored less than 1 are considered inefficient. The results show that out of the 13 pharmaceutical companies investigated, 9 pharmaceutical companies are Osve, Jaber, Alborz Bulk, Iran Injectable Products, Razak, Rouz Darou, Sabahan Oncology, Sina Darou and Shahid Ghazi effective, and Iran Darou, Pars Darou, Tolid Darou and Zahrawi are ineffective.

References

[1] L. Eslami, A. Khamseh; The Impact of Knowledge Management on the Innovation Performance in the Pharmaceutical Industry (Case Study: R&D Department Staff of Salamat Pharmaceutical Investment Holding). 2019;13(1):34-44

[2] H. Dehghan Manshadi; bank branch performance model using a combination of balanced scorecard, data envelopment analysis, and artificial neural networks (Sepe Bank branches, Yazd province), master's thesis in management. February 2018

[3] C. Baldwin, K. Clark; Capabilities and Capital Investment: New Perspectives on Capital Budgeting. Journal of Applied Corporate Finance. (1992).5(2): pp. 67-82.

[4] S. Mojdeh; Multidimensional assessment of supply chain performance: OLAP application. The second national performance management conference. 1384. Tehran University of Management.

[5] M. Daneshvar; Design and explanation of the performance evaluation model of Dana insurance branches using the technique of data envelopment analysis. Humanities master's thesis .1385. Tarbiat Modares University.

[6] A. Agha Rafiei; Performance evaluation of Iran Insurance Joint Stock Company. Thesis of Master of Business Administration.1383. Mazandaran University, Faculty of Social Sciences.

[7] S. Gohar; An introduction to organizational improvement. Today's management magazine. 1375. Volume 9, No. 3 and 4.

[8] G. Kanji; Performance Measurement System, Total Quality Management. (2002). Vol.13, No.5.

[9] A. Agha Rafiei; Performance evaluation of Iran Insurance Joint Stock Company. Thesis of Master of Business Administration. 1383. Mazandaran University, Faculty of Social Sciences.

[10] E. Roghanian, A. Foroughi; AN empirical study of Iranian regional airport using robust data envelopment analysis. International Journal Of Industrial Engineering Computations. 2010. 65-72.

[11] F. Malek; Organization efficiency. Mehr. 1369.Tadbir magazine, No. 5.

[12] R. Kaplan, S. Norton;. Strategy oriented organization, translated by P. Bakhtiari. Industrial Management Organization. 2016.5th edition

[13] Z. Radnor; BSuccess factors for implementing the balanced scorecard in an NHS multi-agency setting. International Journal of Health Care Quality Assurance. (2003). Vol.16 No.2, pp. 99-108.

[14] S.H Chen, C.C Yang, J.Y. Shiau; The application of balanced scorecard in the performance evaluation of higher education. The TQM Magazine. (2006). Vol. 18 No. 2, pp. 190-205.

[15] S. Cohen, D. Thiraios, M. Kandilorou; Performance parameters interrelations from a balanced scorecard perspective An analysis of Greek companies. Managerial Auditing Journal.(2008).Vol. 23 No. 5, pp. 485-503.

[16] M. Mehrgan; Quantitative models in evaluating the performance of organizations. University of Tehran Management Publications. 2015.

[17] A. Adel and D. Gholamrezaei; Ranking the country's provinces with the data coverage analysis approach (using human development indicators). Iranian Economic Research Quarterly. 1385. Year 8. Number 27. Pages 153-173.

[18] A. Charnes, W.W. Cooper, C.T.Clark , B.Golany. A development study of data envelopment analysis in measuring the efficiency of maintenance units in the U.S. Air Forces.Annals of Operations Research,2,95-112. 1985.