

“Integrating the Balanced Scorecard and the Economic Value Added by Using the Analytical Hierarchy Process_ an Applied Study”

Extracted from a master thesis titled:

“Using the analytical hierarchy process in Developing the Performance Measurement and Evaluation Systems at the Responsibility Centers _An Applied Study”

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438

Abstract:

The main objective of this research is to explore how to develop the performance measurement and evaluation systems (PMESs) at the responsibility centers in Misr Bani-suef Cement Company through building a comprehensive system that enables the integration between the Balanced Scorecard method (BSC) and the Economic Value Added measure (EVA) by using the Analytical Hierarchy Process (AHP). In Order to achieve the objective of research, analytical and applied approaches employed. The research population consists of all experts and decision makers working in the company. Due to time and cost constraints, a purposive sample was selected. Total of (120) questionnaires were distributed to the sample of the research. (102) Questionnaires were returned. (17) Questionnaires were rejected due to multiple skipped questions and missing values, leaving (85) questionnaires were valid and usable for data analysis. Thus, the response rate was (70.8%). The appropriate statistical methods of the (SPSS.26) and the expert choice program were used. The research revealed that the company has recently faced a number of challenges and threats that affected its business results and led to a decrease in profits every year. The findings also indicated that using the AHP in building the comprehensive system combing the BSC and EVA raises the efficiency of performance measurement and evaluation systems and helps to provide an index of measuring the financial and non-financial performance gap.

Keywords: Balanced Scorecard – Economic Value Added _ Analytical Hierarchy Process

ملخص البحث:

يهدف هذا البحث إلى تطوير نظم قياس وتقييم الأداء في مراكز المسؤولية في شركة مصر بني سويف للأسمنت من خلال بناء نظام متكامل يجمع بين أسلوب بطاقة الأداء المتوازن ومقياس القيمة الاقتصادية المضافة باستخدام منهجية أسلوب التحليل المتعاقب للعمليات. ولتحقيق أهداف الدراسة تم استخدام المنهج التحليلي والتطبيقي، حيث تم بناء استبانة بغرض جمع البيانات، تكون مجتمع الدراسة من جميع الخبراء وصناع القرار في الشركة حيث تم توزيع (١٢٠) استبانة على عينة الدراسة، خضع منها (٨٥) استبانة للتحليل الإحصائي بنسبة استجابة بلغت (٧٠,٨٪) وتم الاستعانة بالأساليب الإحصائية المناسبة ضمن الحزمة الإحصائية للعلوم الاجتماعية (SPSS.26) وأسلوب التحليل الهرمي لتحليل البيانات واستخلاص النتائج. كشفت الدراسة أن الشركة قد واجهت مؤخرا عددا من التحديات والتهديدات التي أثرت على نتائج أعمالها وأدت إلى انخفاض في الأرباح كل عام. وأشارت النتائج أيضا إلى أن استخدام أسلوب التحليل المتعاقب للعمليات في الربط بين

أسلوب بطاقة الأداء المتوازن ومقياس القيمة الاقتصادية المضافة يرفع كفاءة أنظمة قياس وتقييم الأداء ويساعد على توفير مؤشر لقياس فجوة الأداء المالي وغير المالي.

الكلمات المفتاحية: بطاقة الأداء المتوازن _ القيمة الاقتصادية المضافة _ أسلوب التحليل الهرمي

1- Introduction

Nowadays, organizations are required to compete in globalized and competitive markets. In order to survive in this dynamic environment, they should be able to satisfy all their stakeholders and excel at the same time along all dimensions of performance. A necessary condition for achieving high performance standards is the ability to effectively measure and evaluate an organization's performance. In fact, some famous sayings such as “What you measure is what you get” or “What gets measure gets attention” are widely recognized among both practitioners and academics. Therefore, PMESs are considered as a tool to gain competitive advantages and continuously adapt and react to external changes (Taticchi, Cocca & Alberti, 2010).

In addition, Taticchi, Cocca & Alberti (2010) indicated that to be effective, the PMESs should be dynamic and required to be modified as conditions change so that the measures of performance remain relevant. However few organizations appear to have effective PMES. On the other hand, the ability of keeping the PMESs continuously updated considers a challenge for every organization, especially for small and medium-sized enterprises that need to be very flexible and adaptable to market changes and at the same time being characterized by lack of resources and managerial expertise.

In practice, there are various methods and models used for measuring and evaluating performance such as: The Performance Prism, The BSC (BSC), The Performance Pyramid System, etc. These models help organizations to define the measurement indicators that reflect their goals more adequately, also evaluate their performance, and facilitate the implementation of organizational strategy (Felizardo, Elisabete & Thomaz, 2017). In addition, Singh, Darwish and Potocnik (2016) and Mikulec (2019) indicated that the performance can be measured by using the objective

performance measures that include accounting, financial and mixed measures as well as the subjective measures.

2- Research Problem

Nowadays, traditional PMESs have not been able to provide an integrated picture of performance. This may be due to the fact that the business environment has recently faced many pressures resulting from the liberalization of global trade which led to globalization of the market and the intensity of global competition and increased emphasis on the strategic dimension.

Recently, the BSC is considered the best model used in measuring and evaluating performance through providing five dimensions for measuring both financial and non-financial performance. However, depending on this model only represent some shortcomings in measuring performance. So, the research explores how to integrate the BSC model with the EVA measure in order to overcome the shortcoming of using only the BSC model.

In addition, the AHP is considered one of the most important quantitative methods that help in solving problems. It is a structured technique for organizing and analyzing complex decisions, based on mathematics and psychology. Therefore, the problem statement of this research is to try to explore how to use the AHP in raising efficiency and developing PMESs at responsibility centers through building a comprehensive system that achieves the integration between one of the most important measures of financial performance _ the EVA measure and one of the multi-dimensional methods _ the BSC approach.

In light of the above discussion, the researcher can conclude research problem in the following questions:

- How the AHP enables to build an integrated system that combines the BSC and EVA into one comprehensive system.
- How the use of AHP methodology helps to provide an index of measuring the financial and non-financial performance gap.

3- Research objective

The main objective of this research is to explore how to develop the PMESs at responsibility centers through building a comprehensive system by using the AHP.

4- Research importance

The importance of the current research is presented in benefiting from the advantages of financial performance measures and features of non-financial performance measures to avoid their shortcomings through building a comprehensive system by using the AHP.

5- Research limitation

The research has some limitations which could be presented as follows:

- The integration between the BSC model and other accounting and financial performance measures had not been included in the research.
- There are some other methods otherwise the AHP to achieve the integration among approaches whether direct or indirect had not been included in the research.

٦- Research methodology

To attain the research objectives, the researcher followed the inductive approach which aims to give a general overview of PMESs in the Cement industry and the AHP as well as formulate its conceptual framework. In addition, applied research is conducted to answer the questions of research and achieve its objective.

٧- Research plan

To achieve research objectives, this research is divided into the following sections:

8.1 The Conceptual Framework of the BSC

8.2 The conceptual framework of the EVA

8.3 The AHP- based valuation framework

8.4 Applied study

8.5 Summary, research results and Future Studies

References

8.1 The Conceptual Framework of the BSC

The BSC was introduced by Kaplan and Norton (1992) as a performance measurement and evaluation tool that added non-financial Performance measures into the traditional financial measures to give managers and executives a clearer and overall view of organization's performance. It has developed from its early use as an easy performance measurement tool to a full strategic planning and management system. The BSC was designed as a result of the need to involve the non financial variables into the performance measure system. It provides a framework that not only considered as performance measurement system but also enables planners to identify what should be performed, measured and carried out. (Fadaly & Younes, 2016).

8.1.1 The characteristics of the BSC

Malgwi and Dahiru (2014) indicated that the BSC combines financial and non-financial measures to establish a full picture regarding the performance of an organization, because it mixes different measures: qualitative and quantitative and financial and operational. It also links the long-term strategic goals with the short-term actions.

1-Customer perspective: If customers are not satisfied, they will not come back. Thus, customer satisfaction is important to achieve the organization's financial goals identified in the financial perspective of the BSC. Customers are usually concerned with four particular attributes of a product or service: (i) price, (ii) quality, (iii) the service, and (iv) timelines (the shorter the better).

2- Internal business process perspective: According to Malgwi and Dahiru (2014), internal processes perspective is based on the internal business

outcomes that lead to financial success and customer satisfaction. In order to achieve the organizational objectives and meet customer expectations, organizations should determine the main business processes at which they should excel.

3- Learning and growth perspective: This perspective focuses on how the organization's employees learn and grow in their careers to improve the organization's performance. According to Malgwi and Dahiru (2014), the learning and growth perspective shows the employees' ability (skills, knowledge, talents, and training), the information systems' quality (systems, networks, and databases) and the impacts of organizational alignment (leadership, culture, and teamwork) in supporting the achievement of organization's objectives.

4- The financial perspective: Malgwi and Dahiru (2014) indicated that the financial perspective aims to answer the question: "in order to succeed financially, how should the organization appear to its shareholders?".

5- The environmental perspective: The integration of environmental indicators into the BSC leads to achieve consistency between them and the organization's goal as a whole, as well as the possibility of their implementation and application throughout the organization by adopting an integrated strategy for sustainable development.

8.1.2 BSC implementation steps

In order to adopt and implement the BCS, the company should follow certain steps as mentioned by (Turki & Dila, 2009):

The first step: clarifying the vision: during this process, managers should develop the BSC which will define the general goals and measures and translate the vision into strategic objectives.

The second step: communicating and linking strategic objectives and measures: managers should communicate strategy up and down the company and link it to functional and individual objectives.

The third step: planning business: this enables companies to integrate their businesses with financial plans, set targets and align strategic initiatives.

The fourth step: feedback and learning: review processes are based on whether the organization, its departments, or its staff have met their goals.

8.1.3 Strength of Balance scorecard

There are many benefits of adopting the BSC as a performance measurement method by organizations. It represents a set of measures that combine in order to give a “comprehensive and quick” view of the organizations. Indeed, it provides managers with the needed information by combining in a single performance-measurement report. In addition, it enables the organizations to develop a more comprehensive picture of their operations and to match the operating and investment activities to short and long- term strategic objectives. This approach provides a clear prescription about what organizations should measure (Khairat, 2015).

From the view point of researcher, despite the advantages of adopting the BSC in organizations, it ignores some important aspects. From the financial perspective, the BSC focuses on measuring only whether the project is profitable or not and do not measure if the profit is sufficient to cover the capital employed in the project or could be invested in other alternative opportunities. Therefore, there may be a profitable project form the view points of accounting reports, but a loser project form the view points of economic reports. This means that the accounting profit is not sufficient to cover the required economic return on capital invested.

Based on that, there is a necessity of supporting the BSC by integrating it with one of the modern administrative methods (EVA) that shows the real economic profit and answers the question of how much the company would generate returns above the cost of capital for other alternative opportunities.

8.2 The conceptual framework of the EVA

Under traditional accounting, most organizations look profitable but many in reality are not. In other words, what we call profit; it is not profit at all. Until an organization returns a profit which is greater than its capital cost,

it operates at a loss. In addition, it pays taxes as if it had a real profit. The organization still returns to the economy less than it consumes in resources, until then it does not generate wealth; it destroys it. (Siniak & Lozoska, 2019).

Therefore, the question now is "is there a single measure of organization performance enabling investors to determine investment opportunities and encourage managers to take value-added business decisions? Based on the above, a new measure of performance known as —EVA has introduced. EVA has provided the shareholders with the better way to measure the true economic performance of the organization. Also, managers have a better plan how to make a shareholder value and encourage its staff.

8.2.1 The concept of the economic value added

Although EVA model was fully applied for the first time by Stern & Stewart & Co. in the 1990, a similar concept had been found by economists for many years before that. In 1890, the famous economist Alfred Marshall spoke for the first time about the concept of economic profit, in terms of the real income that an organization makes, besides the different operating costs, and the cost of its invested capital (Ende, 2017).

EVA approach performance measurement has a new meaning unlike the traditional approach which is only based on the simple concept of accounting profits and the related ratios derived from them, such as return on assets (ROA) and the return on equity (ROE). The difference is that the traditional performance measurement measures do not take into account the capital cost (equity and debt) for generating the profits made by an organization. therefore, under the traditional approach, two organizations that have identical ROE would be considered as equally successful, while under the EVA approach, the same result could not be reached if these two organizations had a different capital cost, in other words if their economic income or residual income was different (Mikulec, 2019).

8.2.2 The importance of the economic value added

According to Sabol and Sverer (2017), EVA basically forces managers to realize that when they use capital, they should pay for it as if it were a wage. It changes their viewpoints as they themselves become business men.

In fact, this makes them act more responsibly towards existing assets. Also, EVA provides a good measure of year-to-year value that the organization creates. In addition, because EVA measures the performance in terms of 'value', it must be the base of every financial management system for developing and setting corporate and business strategy, or for assessing performance, capital investment decisions and corporate acquisitions.

Despite the advantages of EVA, the concept of EVA has some inherent problems that are limiting the using of it. Some of the limitations include: that EVA is considered a short-term performance measure. Some organizations found that EVA does not suit their businesses because they focus on long-term investments. Also, the real EVA or real return of long - term investments cannot be objectively measured because future returns cannot be measured; they can only be estimated subjectively (Sabol & Sverer, 2017).

Based on that, the researcher concluded that EVA should not fully replace accounting profits as a performance measure. Accounting profit measures still have important information value even if the EVA is already in use. In addition EVA, organizations should follow up the traditional accounting profit measures such as Earnings per share, Return on assets Return on equity, etc.

8.3 The AHP- based valuation framework

According to (Nader & Youssef, 2015), AHP is a simple, mathematically based Multi-Criteria Decision Making technique to deal with unstructured and complex problems in a hierarchal structure presenting the relationships among goal, criteria, sub criteria, and alternatives.

8.3.1 The application steps of AHP implementation

Based on the studies of (Kheybari et al, 2019; Enar & Awny, 2017; Nader & Youssef, 2015), the AHP can be applied by following the steps below:

Step1: Identifying the decision problem and developing criteria of selection: This step is to clearly identify the problem because it is the base of overall decision-making process.

Step 2: selecting the decision-makers: this step is to depend on experience of decision-makers or some criteria that are derived from different fields.

Step3: building the hierarchal structure of the problem: The strength of AHP approach is presented in providing a systematic solution by logically dividing the problem into its levels from the largest to the smallest in descending order, and then regulating these levels according to their relative importance. The AHP has at least three levels: goal, criteria and alternatives.

Level 0 represents the goal of the analysis. Level 1 represents the criteria that consist of different factors. Several other sub criteria be added but they were not used here. Level 2 represents the alternative choices. In level 1 there will be 1 comparison matrix that is resulted from pair-wise comparisons between 4 factors with the goal. Therefore, the comparison matrix of level 1 has size of 4 by 4. Then, because each alternative is connected to each criterion, and there are 3 alternatives and 4 criteria, so in general there will be 4 comparison matrices at level 2. Each matrix has size 3 by 3. Figure (1) shows the full hierarchy.

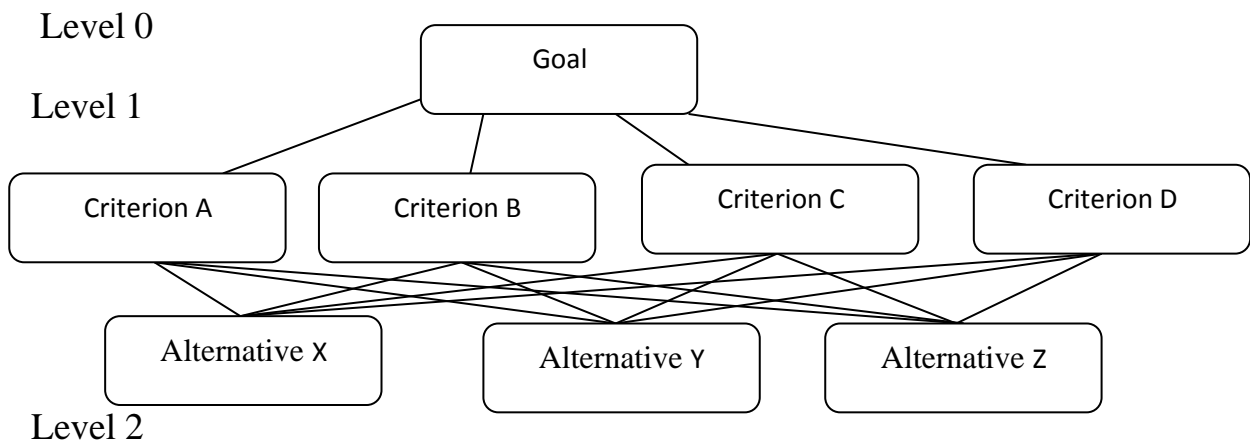


Figure (1)
Full hierarchy

Step 4: collecting data from the decision-makers: This step is to obtain data through direct questioning experts to assign weights to elements of the hierarchal structure of the decision.

Step 5: the construction of decision matrix: Based on the nine-point scale introduced by Saaty (1996), the decision matrix is constructed. Here, the decision makers use the fundamental 1-9 scale to assess the relative importance. The Scale of Relative Importance According to Saaty (1996) is presented in table (1). The decision matrix involves assessing each alternative with regard to the each criterion. If the problem of decision making contains n criteria and m alternatives; the decision matrix takes the following form:

$$D = \begin{pmatrix} d_{11} & d_{12} & \dots & d_{1n} \\ d_{21} & d_{22} & \dots & d_{2n} \\ d_{m1} & d_{m2} & \dots & d_{mn} \end{pmatrix}$$

Table (1)
the Scale of Relative Importance According to Saaty (1996)

Intensity of Importance	Definition	Explanation
1	Equal Importance	Two activities contribute equally to the goal
3	Moderate importance	judgment and Experience slightly favor one activity over another
5	Strong importance	judgment and Experience strongly favor one activity
7	Very strong importance	Judgment and Experience very strongly favor one activity. And it showed dominance in practice.
9	Extreme importance	The evidence favors one activity over another. It is the highest confirmation of its importance.

2,4,6,8	For compromise between the values mentioned above	Intermediate values of importance
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Reciprocal → If variable i has one of the above numbers assigned to it when compared with variable j , then j has the value $1/\text{number}$ assigned to it when compared with i . More formally if $n_{ij} = x$ then $n_{ji} = 1/x$

Step 6: The third step includes making pair-wise comparison of the elements of the hierarchy. The aim of that is to set their relative importance with regard to each element at the next level. Based on the nine-point scale introduced by Saaty, the Pair-wise comparison matrix will be at the following format, where w_i is considered the weight value of the criteria:

Decision matrix	Pair comparison matrix
$\begin{pmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \dots & \dots & \dots & \dots \\ a_{n1} & a_{n2} & \dots & a_{nn} \end{pmatrix}$	$\begin{pmatrix} W_1/w_1 & W_1/w_2 & \dots & W_1/w_n \\ W_2/w_1 & W_2/w_2 & \dots & W_2/w_n \\ \dots & \dots & \dots & \dots \\ W_n/w_1 & W_n/w_2 & \dots & W_n/w_n \end{pmatrix}$

Step 7: preparing the normalization matrix: The comparison matrix should be normalized. So, each element should be divided by the total entries in the corresponding column. By that way, a normalized matrix is obtained where the total of all elements equal 1.

Step 8: calculating The Eigen values: In this step, the relative weights obtained must satisfy the formula : $(A * W = \lambda_{\max})$ where A is the Pair-wise comparison matrix, W is the weight and λ_{\max} is the highest Eigen values. Here, if there are elements upward in the hierarchy, the weight vector will be calculated as follow: every element (weight coefficient) will be multiplied by its parent at the higher level. This process continues until reaching the top of the hierarchy. The alternative that has the highest weight coefficient value has to be taken as the best alternative.

Step 9: Verify the consistency: This step involves Verifying the consistency of judgments across the Consistency Index (CI) and the Consistency Ratio (CR). Where; $CI = (\lambda_{\max} - N) / (N - 1)$

Where λ_{\max} represents the Eigen value corresponding to the pair-wise comparisons matrix and n is the number of elements being compared. While the Consistency ratio (CR) is calculated by: $CR = CI / RI$

Where RI is a random consistency index outlined in Table (2). generally, the value of CR that is less than or equal to 0.1 is acceptable; otherwise the pair-wise comparisons will be revised to reduce inconsistency.

Table (2)
Average RI Values

N	1	2	3	4	5	6	7	8	9	10
RI	0	0	0.58	0.9	1.12	1.24	1.32	1.41	1.45	1.49

8.3.2 Building the comprehensive performance measurement and evaluation system by using AHP

Based on the research of Moradi, Malekmohammad and Jamalzadeh (2018), Hassan and Fadel (2013), the steps of integrating the EVA and BSC through the AHP can be summarized as follows:

Step 1: form the team of work: The top management should form the work group according to specific standards.

Step 2: training the work team and defining the concept and applied methods of the BSC, EVA and AHP through the training courses of work team.

Step 3: collecting data about the organization: the BSC is considered a tool of drawing the organization's future strategy. This requires providing data about the pervious and current performance of organization.

Step4: determining the organization's vision and mission: based on the data that is collected in the previous step, the next step is to determine the vision and mission of the organization as a whole.

Step 5: building the hierarchal structure of the problem: this step presents in building the hierarchal structure of the problem to connect the

organization's vision (the general goal) with the strategic objectives that achieve the vision through dividing the hierarchical structure into several levels as follows:

Level 0: it is the organization's vision.

Level 1: it is the strategic objectives that achieve the vision according to each dimension of the BSC.

Level 2: it is the performance measures that reflect the strategic objectives.

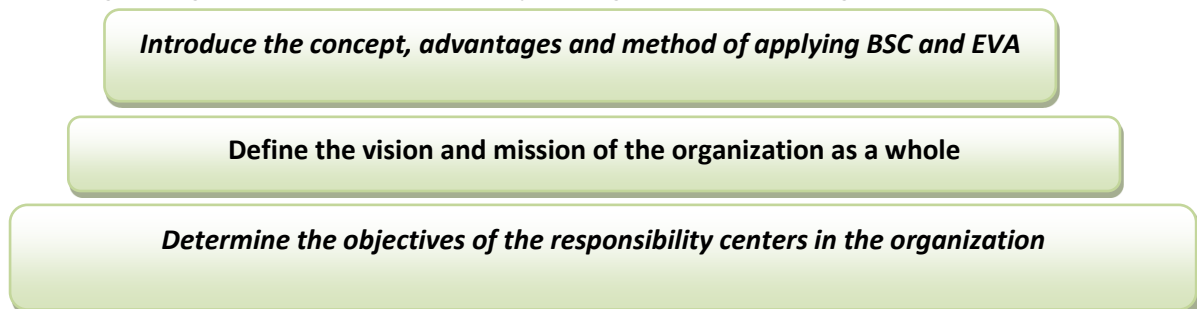
Step 6: determining the strategic objectives that achieve the organization's vision: this step presents the determination of the strategic objectives according to the five dimensions of the BSC.

Step 7: determining the performance measures that reflect the strategic objectives according to the BSC. This step is to translate the strategic objectives into measures through choosing one measure or more for each dimension in the BSC in order to determine how well the organization achieves these strategic objectives during specific period.

Step 8: apply the model: this is through building pair-wise comparison matrices for the strategic objectives level and measures level and completing the mathematical procedures of the AHP either by hand or by using the expert choice program in order to achieve the objective of the research.

Finally, after applying the model, the managers should prepare a performance report and follow up the performance efficiency.

The research can summarize all the previous steps of building a comprehensive performance measurement and evaluation system through integrating the BSC and EVA by using the AHP in figure (2):



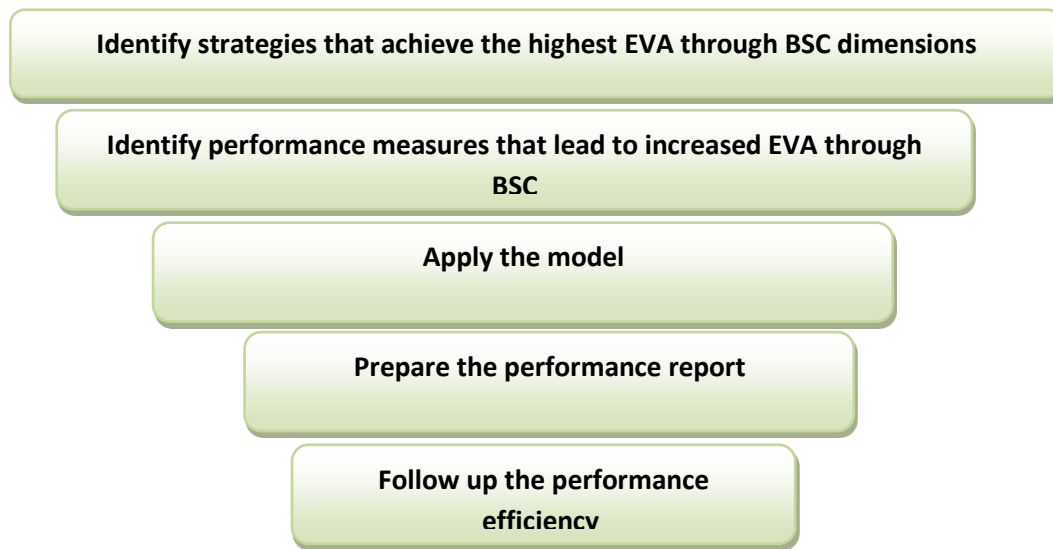


Figure (2)
a comprehensive performance measurement and evaluation system
through integrating the BSC and EVA by using the AHP

Source: self work

8.4 An Applied study

The research is applied on the performance of Misr Beni-Suef Cement Company in 2020. It is an Egyptian joint stock company subject to the provisions of the law No 8 / 1997 (Law on Investment and Incentives).

The relative measures (pair-wise comparison matrices) have been prepared in advance based on the AHP and distributed to the experts and decision makers in the responsibility centers in Misr Bani-Sues Cement Company. Total of (70) relative measures were distributed to the decision makers and experts in the company. (69) relative measures were returned. (9) relative measures were rejected due to multiple skipped questions and missing values, leaving (50) relative measures were valid and usable for data analysis

8.4.1 Building the hierarchal structure of the research

The researcher built the hierarchal structure of the research to connect the company's vision (the general goal) with the strategic objectives that achieve the vision though dividing the hierarchal structure into several levels as follows:

Level 0 represents the organization's vision. The research can suggest the company's vision as "for example, increasing EVA of 30% of the previous year (2019)".

Level 1 represents the strategic objectives that achieve the vision according to each dimension of the BSC. The research can suggest the company's strategic objectives that are appropriate to achieving the general goal according to the five dimension of the BSC as shown in table (3):

Table (3)
the strategic objectives that achieve the goal

The BSC dimensions	The strategic objectives
Financial dimensions	Revenue growth
customer dimensions	Profitability
Internal processes dimensions	Customer retention and satisfaction
Learning and growth dimensions	employee retention and satisfaction
environmental dimensions	Environmental protection

Source: self-work

Level 2 represents the performance measures that reflect the strategies. These measures have been approved through the questionnaire (No.1) that has conducted.

The researcher can summarize all the three levels of building a comprehensive performance measurement and evaluation system through integrating the BSC and EVA by using the AHP in figure (3).

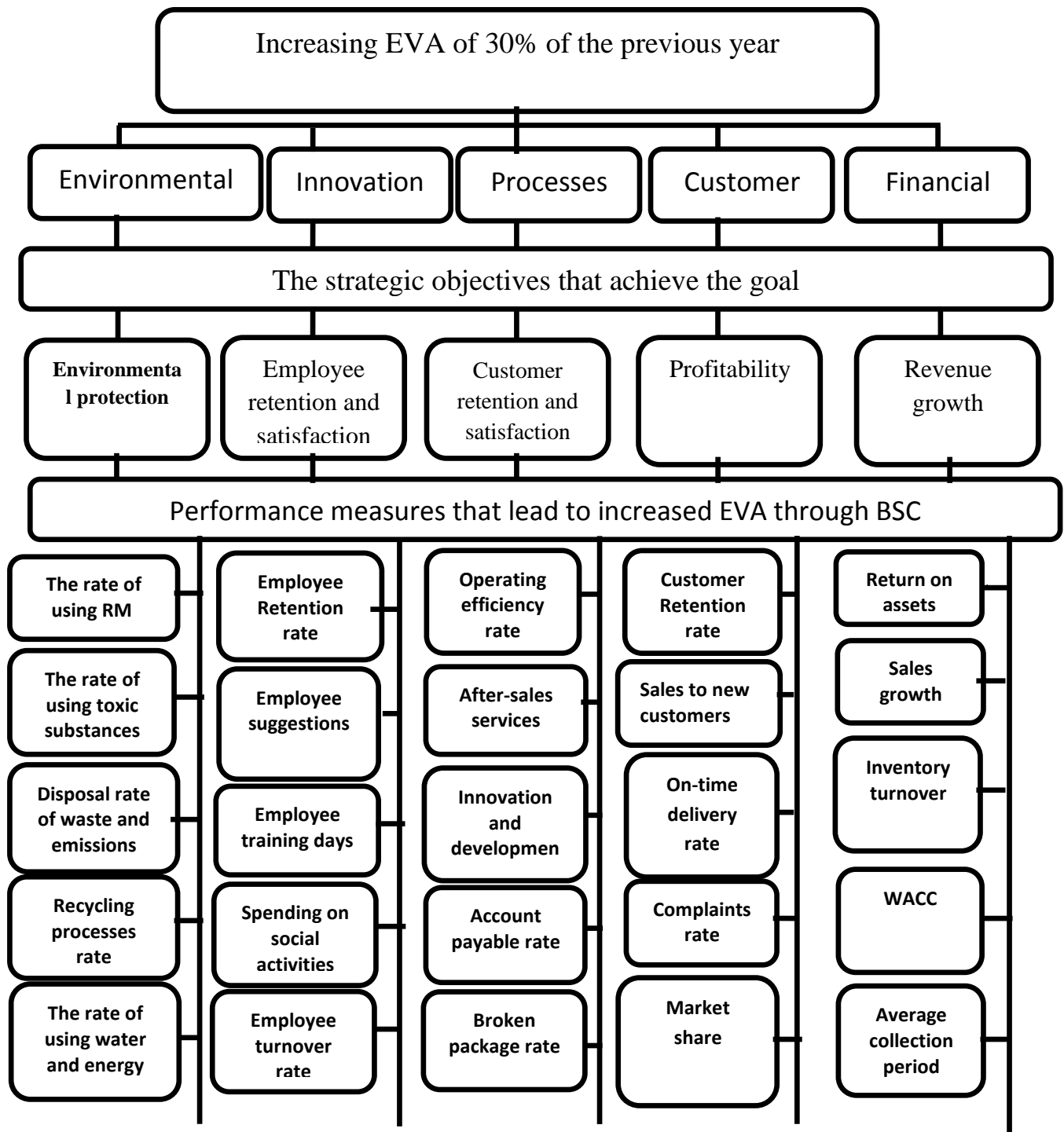


Figure (3)
a comprehensive performance measurement and evaluation system

Source: self-work

Then, the research prepares the relative measures (the pair-wise comparison matrices) of criteria (strategic objectives) and alternatives (performance measures) for obtaining the relative weights of criteria. Then, inputs data to the Expert Choice program that particularly designed for that purpose. Finally, the general model of choice is obtained.

The Expert Choice program automatically calculates the Consistency Ratio (CR) of input data to ensure that it doesn't exceed 10% according to the methodology of AHP. In case the ratio exceeds the limit, data will be revised again by experts.

8.4.2 The pair-wise comparison matrices of criteria and analysis results

The relative measures (pair-wise comparison matrices) have been prepared in advance based on the AHP and distributed to the experts and decision makers in the responsibility centers in Misr Bani-Sues Cement Company to determine their personal preference according to the Scale of Relative Importance

The AHP is conducted to calculate weights of criteria and alternatives by using Expert Choice program through the following steps:

1. Constructing pair-wise comparison matrices of strategic objectives and Calculating Eigen vector (relative weights) of each strategic objective.
2. Constructing pair-wise comparison matrices of performance measures according to each strategic objective and Calculating Eigen vector (relative weights) of each performance measure.
3. Constructing the final matrix of priorities.

The final step in applying the methodology of the AHP is to account the combined Eigen vector for arranging priorities of strategic objectives and performance measures so that the performance measurement and evaluation systems can be developed. Table (4) shows the combined Eigen vector and preferential ranking.

Table (4)
the combined Eigen vector and preferential ranking

strategic objectives	Relative weights	Performance measures	Relative weights	(the combined Eigen vector)	Preferential ranking
revenue growth	58.14	Return on net assets	27.51	15.99%	4
		Sales growth rate	24.95	14.50%	6
		Inventory turnover	13.37	7.77%	10
		WACC	19.3	11.22%	8
		Average collection period	14.8	8.60%	9
Profitability	95.13	Customers Retention rate	24	22.83%	1
		Sales from new accounts	15.59	14.83%	5
		On-time delivery rate	22.22	21.13%	2
		Rate of complaints	21.36	20.31%	3
		The organization's share of market	13.59	12.92%	7
Customer retention and satisfaction	23.77	Operating efficiency rate	22.73	5.40%	12
		After-sales services	26.63	6.32%	11
		Innovation and development rate	15.49	3.68%	16
		Account payable rate	16.55	3.93%	15
		Broken packages rate	18.61	4.42%	14
Employee retention and satisfaction	13.73	Employee retention rate	26.34	3.61%	17
		Employee suggestions rate	20.75	2.84%	21
		Employee training days	16.30	2.23%	25
		spending on social activities rate	19.13	2.62%	22

		Employee turnover rate	17.49	2.40%	24
Environmental protection	17	The rate of using raw materials	18.85	3.20%	20
		The rate of using energy	19.53	3.32%	19
		The rate of using toxic substances	26.73	4.54%	13
		Disposal rate of waste and emissions	20.07	3.41%	18
		Recycling processes rate	14.83	2.52%	23

Source: self work.

8.4.3 Measuring financial and non-financial performance gap (deviation)

The AHP is used to providing an index of measuring the financial and non-financial performance gap through the following steps: determining the targeted performance, determining an index of measuring targeted performance, measuring the actual performance, determining the completion rate, determining an index of measuring actual performance and finally, measuring the financial and non-financial performance gap. Table (5) shows the performance gap during the financial year ended 31 December 2020.

Table (5): the performance gap during the financial year ended 31 December 2020

performance measures	Index of targeted performance	Index of actual performance	The performance gap
Return on net assets	15.99%	4.3%	(11.7%)
Sales growth rate	14.50%	(2.5%)	(17%)
Inventory turnover	7.77%	4.4%	(3.4%)
Weighted average cost of capital	11.22%	0.002%	(11.2%)
Average collection period	8.60%	8.60%	0
Customers Retention rate	22.83%	17.8%	(5%)
Sales from new accounts	14.83%	6.6%	(8.2%)
On-time delivery rate	21.13%	18.9%	(2.2%)
Rate of complaints	20.31%	20.31%	0
Market share	12.92%	7.9%	(5%)
Operating efficiency rate	5.40%	5.2%	(0.2%)
After-sales services	6.32%	4.6%	(1.7%)
Innovation and development rate	3.68%	3.68%	0
Account payable rate	3.93%	0.001%	(3.9%)
Broken packages rate	4.42%	4.42%	0
Employee retention rate	3.61%	3.2%	(0.4%)
Employee suggestions	2.84%	2.84%	0
(%increase)	2.23%	2.23%	0
Employee training days	2.62%	2.62%	0
spending on social activities rate	2.40%	0.001%	(2.4%)
Employee turnover rate			
The rate of using raw materials	3.20%	2.8%	(0.4%)
The rate of using energy	3.32%	3%	(0.3%)
The rate of using toxic substances	4.54%	9.1%	(4.6%)
Disposal rate of emissions	3.41%	3.3%	(0.1%)
Recycling processes rate	2.52%	2.1%	(0.4)%

Source: self work.

8.4.4 Conclusion

Based on the applied research, the performance measures that don't need improvement due to the actual performance being equal to the targeted performance were determined; these measures include (Average collection period, Rate of complaints, Innovation and development rate, broken packages rate, Employee suggestions rate, Employee training days and also expenditure on social activity rate

While the other performance measures need improvement due to the actual performance not being equal to the targeted performance. In addition, the performance measures were arranged in a preferential order according to their relative weights (priorities) to reach the general goal as follows: Customers Retention rate, On-time delivery rate, Rate of complaints, Return on net assets, Sales from new accounts, Sales growth rate, market share, WACC, Average collection period, Inventory turnover, After-sales services, Operating efficiency rate, The rate of using toxic substances, Broken packages rate, Account payable rate, Innovation and development rate, Employee retention rate, Disposal rate of waste and emissions, The rate of using energy, The rate of using raw materials, Employee suggestions rate, spending on social activities rate, Recycling processes rate, Employee turnover rate, Employee training days

Nevertheless, the financial and non-financial performance gap was identified of 73%. Therefore; the organization's managers should exert efforts to narrow the financial and non-financial performance gap by focusing on the measures with important relative weights that would help in maximizing value to customers and shareholders via increasing EVA.

8.5 Summary, research results and Future Studies

The purpose of this research was to develop the PMESs at the responsibility centers through building a comprehensive system that enables the integration between the BSC method and the EVA measure by using the AHP (AHP). In order to achieve this goal, the research comprised two major parts; theoretical and applied. The researcher concluded the following results:

- Using the AHP in building the comprehensive system combining the BSC and EVA raises the efficiency of PMES and helps to achieve the strategic dimension of business organization.
- The AHP helps to provide an index of measuring the financial and non-financial performance gap that enables the organization to pay attention to poor performance areas which in return would help in maximizing value to customers and shareholders via increasing EVA.

Based on the research results, the researcher suggests the following future studies:

- Conducting research that integrates the BSC and EVA and the effect on organizations' value by using another statistical technique.
- Conducting research that combines the BSC and EVA and another managerial tools to raise the performance efficiency.

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