Developing the Balanced Scorecard Model to be used for Evaluating Resources Planning Systems Performance

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Abstract: - The balanced scorecard serves as a valuable tool for assessing performance, particularly in the domain of information systems. This research aimed to use a balance scorecard, which consists of four dimensions: the financial, internal process, users' satisfaction, and learning and growth in evaluating the resource planning systems. By using a questionnaire, the data was collected from 382 respondents. The results of the data analysis showed that all the dimensions have moderate averages; the performance of the resource planning systems by applying the balanced scorecard equations is moderate for its four dimensions, with an average value of 64%, which is less than the targeted value according to the respondents' opinions. The research recommends increasing the opportunities for training to improve users' satisfaction in using resource planning systems.

Key-Words: - financial performance, internal processes, learning and growth, user satisfaction, administration systems, computing.

Received: April 9, 2024. Revised: September 15, 2024. Accepted: October 17, 2024. Available online: November 25, 2024.

1. Introduction

Management Information Systems (MIS) plays an important role in supporting decision-making. The optimal use of data is the main factor that contributes to achieving the strategic goals of organizations by analyzing the results of administrative processes for issuing reports and improving performance in a short period. Information systems management is considered an essential element in business management and has an important impact on improving performance.

Programming companies have been interested in developing management information systems to suit different administrative units such as production, accounting, finance, purchasing, and human resource management. Among these systems is Enterprise Resource Planning (ERP) [1]. ERP systems have spread widely to include many sectors to ensure speed and efficiency and gain user satisfaction due to the ability of these systems to communicate quickly between different departments [2]. These systems help in increasing the level of forecasting needs, maximizing profits, improving the quality of services, and reducing costs. Despite all these advantages of these systems, there are great challenges that sometimes hinder the spread of these systems, including their high cost and the need for users who have sufficient competence to work on these systems [3]. To ensure the success of these systems. It is necessary to measure the performance of these systems, as some institutions suffer from a decrease in the level of performance instead of an improvement in performance [4].

The balanced scorecard is one of the useful tools in evaluating performance through financial and non-financial metrics that enables organizations to identify the most prominent weaknesses, address them, and develop their strengths to manage their resources and raise the level of their services [5], [6].

A balanced scorecard can improve human resources management and the organization environment by providing incentives for employees and developing business procedures [7]. The balanced scorecard starts from the dimension of learning and growth by focusing on the capabilities of employees and increasing their knowledge, and thus it will affect the internal processing dimension in terms of quality and timing. Which in turn will affect the level of service, which will lead to earning customer loyalty and continuity and all of them have an impact on the financial dimension in influencing profitability and investment [8], [9].

2. What Distinguishes This Study from Others?

This research distinguishes from other research in the use of the balanced scorecard to evaluate the performance of ERP systems, and this is the first time that the balanced scorecard data was collected

from a questionnaire that was allocated to users of ERP systems, as this questionnaire included statements distributed over the four dimensions of the balanced scorecard. Therefore, this paper combined the balanced scorecard and the questionnaire.

3. Research Terms

Performance: an organization's ability to utilize the available resources efficiently to achieve the objectives of the organization [10].

Resource planning system: a system that relies mainly on a common database that allows departments to store and retrieve information, arrange it and link it with other departments' models and add new models, to improve performance [11].

A balanced scorecard is a management tool for measuring strategic performance for supporting the implementation of strategies and the development of strategic goals [12].

Internal processing: efficiency of planning and executing the organization's various operations [13].

Users' satisfaction: the degree to which the users feel that the system provides all the information they need and secures qualitative goods and services for their users [14].

Learning and Growth: The extent to which users can learn, develop, and improve ability [15].

4. Research Problem

Institutions seek to acquire computer systems that enhance the efficiency of their business to provide the best services to their customers by reducing time and effort and increasing communication between administrative units to provide the necessary data for each department to complete its work. This requires re-engineering operations to suit the resource planning systems.

Through personal interviews with some users of resource management systems in service institutions, the need to evaluate such systems was found because some users suffer from the use of these systems. One of the methods that have been found to be suitable for evaluating these systems is the balanced scorecard model. This model is used to diagnose the obstacles within the dimensions of the balanced scorecard model.

5. Research Significance

The importance of this research is as follows:

i. Determining the extent to which resource planning systems contribute to achieving institutional excellence from the point of view of the actual users of these systems.
ii. Indicating the extent to which the balanced scorecard model can evaluate performance and diagnose the obstacles necessary for the success of these systems.
iii. This research covers gaps due to the lack of scientific research published on the use of the balanced scorecard model in measuring the performance of resource planning systems.

6. Research Questions

From the research problem, the research questions are as follows:

i. What is the impact of resource planning systems on the financial dimension from the point of view of users of the systems?
ii. What is the impact of resource planning systems on the internal processing dimension from the point of view of users of the systems?
iii. What is the impact of resource planning systems on users' satisfaction from the point of view of users of the systems?
iv. What is the impact of resource planning systems on learning and growth from the point of view of users of the systems?

7. Research Objectives

The aim of this research is to test the developed model by using the balanced scorecard to evaluate the performance of ERP systems. The sub-objectives are the following:

i. Evaluating the level of financial performance of the resource planning systems from the point of view of the users of the systems.
ii. Evaluating the performance level of the internal processing of the resource planning systems from the point of view of the users of the systems.
iii. Evaluating the level of users' satisfaction of the resource planning systems from the point of view of the users of the systems.
iv. Evaluating the level of learning and growth of the resource planning systems from the point of view of the users of the systems.

9. Research Limits

The limitations of this research are as follows:

Objective limits: the topic of this research is determined by choosing the possibility of applying the balanced scorecard model in evaluating resource planning systems.

Human limits: represented by users of resource planning systems in the service sector.

Temporal limits: The data was collected during the year 2022.

10. Theoretical Framework and Previous Studies

Resource planning systems are unified systems that administrators and users need to manage and operate the operations and tasks in the organization in a way that maintains competitive advantage [16]. Resource planning systems have become one of the vital tools for enterprise management as they are integrated information systems [17]. ERP systems are designed to collect data from multiple sources to effectively process and use it to improve performance [18], as many organizations have tended to re-engineer their processes to enhance their performance using ERP systems [19].

The great challenge facing the application of ERP systems is to link data from multiple sources, in addition to the great challenge represented by the extent of user acceptance of the system [20]. Therefore, it is necessary to adopt the use of resource planning systems as a strategic tool to achieve the goals of any institution [21].

ERP systems have multiple benefits in providing support to reach the highest efficiency while reducing costs [22]. In addition to its ability to monitor the movement of transactions and procedures with the possibility of setting appropriate criteria for evaluating the processes and procedures that are carried out in this system, these systems have a high degree of confidence in the exchange of data and information, in addition to the possibility of uploading it to the cloud to reduce the costs of its management [23].

ERP systems include multiple applications that can easily transfer and use data, for example in production planning, purchasing, sales, inventory control, human resource management, and financial management [24]. It can also perform accounting, financial and profit analysis, cost calculation, and future forecasting [25]. Resource planning systems provide the best management solutions, and to implement them effectively requires the conformity of the system operations with the operations of the institution. One of the important things that must be implemented is the evaluation of the systems to verify the suitability of these systems with the goals of the institution [26]. Organizational culture plays a major role in enhancing the success of ERP systems and thus reducing resistance to change. Training, for example, reduces the chances of failure by expanding the users' perceptions and increasing their knowledge of the benefits of these systems [27]. The application of these systems requires continuous support from higher management, with clarification of the objectives of these systems to users [28].

Several studies have been conducted related to ERP systems. In the Sultanate of Oman, a study was conducted to show the factors affecting the implementation of ERP systems. The results of this study showed that these systems have received great attention because they play an important role in achieving the goals of institutions [29]. A study was conducted on the Korean institutions applying ERP systems, as this study aimed to assess the factors affecting the performance of ERP systems. The results of this study showed that training is of great importance in the users' awareness of the importance of these systems, and the continuous development of these systems has a strong impact on the success of these systems [30] A study was conducted in China aimed to evaluate the post-implementation of resource planning systems. The results of this study showed the necessity of solving problems related to users to increase their satisfaction with the use of these systems [31].

The balanced scorecard as a performance measurement tool was proposed by Kaplan & Norton in 1992 [32]. It includes four dimensions: the financial dimension, the internal process dimension, the user satisfaction dimension, and the learning and growth dimension. The balanced scorecard facilitates the periodic review of the strategy while accelerating correction procedures by translating trends into measurable goals. Feedback also improves oversight on clear numerical and quantitative bases, as well as creating a language of communication between departments on unified realistic bases [33], [34].

Any organization can improve operational efficiency by implication balanced scorecard [35]. The balanced scorecard serves as the basis for planning a strategic information systems management system by following appropriate development steps, identifying appropriate metrics, and overcoming all implementation obstacles [36]. The balanced scorecard is used in organizations around the world to focus on operations and align their objectives to achieve the organization's mission, vision, and strategy. The balanced scorecard can enhance communication between internal and external stakeholders [37]. The implementation of the balanced scorecard is linked to factors that can be divided into characteristics of the company and characteristics of those responsible for management [38].

Organizations need a set of key performance indicators to evaluate their progress toward

achieving their strategy. The balanced scorecard is one of the important tools that help in measuring their key performance indicators [39]. The balanced scorecard helps managers in following up on strategic plan formulation and implementation processes as well as measuring key performance indicators [40]. The balanced scorecard has the ability to track the implementation of strategies through performance measurement systems for various sectors, including the healthcare sector [41].

Two studies were conducted in Taiwan to evaluate the performance of resource planning systems using the balanced scorecard. The results of these studies showed the ability of the balanced scorecard to demonstrate the ability of these systems through the four dimensions to achieve the goals [42], [43]. In Britain, a study was conducted to measure performance and user satisfaction using the balanced scorecard. The results of this study showed weaknesses in the application of resource planning systems and recommended the need to measure performance after applying the systems [44].

Tawse and Tabesh in 2023 [45] summarized the experience of using the balanced scorecard over the past thirty years, and they found the efficiency of its use in strategic planning and the importance of its appropriate application to be used efficiently. Pierce in 2022 [39] stressed the importance of conducting more research related to the balanced scorecard to benefit from it in managing the institutions and systems that use it. Balanced Scorecards and Financial data have successful results in improving organizational strategic management and can improve the competitive positions of small and medium companies [46], [47].

The balanced scorecard focuses directly on customers, financial management, integrated reporting, strategic performance management, sustainable development, and systems thinking. The balanced scorecard has gained significant attention because of its focus on sustainability [48].

11. Research Methodology

The quantitative approach was applied to analyze the data collected using the study tool, which is a questionnaire designed to measure performance and draw conclusions and recommendations.

To achieve the objectives of this research, a balanced scorecard model was developed, which includes four dimensions: the financial dimension, the internal processing dimension, the user satisfaction dimension, and the learning and growth dimension. Fig. 1 shows the conceptual model developed for this research. The financial dimension consisted of three matrices (performance, report analysis, and planning); the internal processing dimension consisted of three matrices (quality, efficiency, and support); the user satisfaction dimension consisted of two matrices (satisfaction and service); and the learning and growth dimension consisted of two matrices (training and innovation).

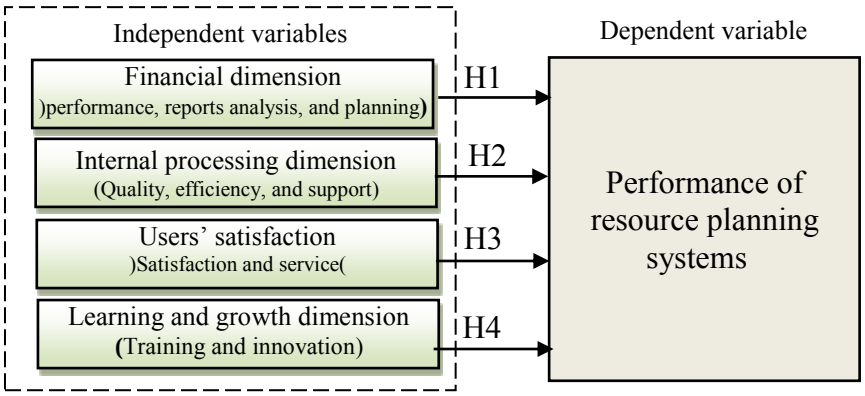

Fig. 1. Conceptual model of this study

12. Research Variables

The research variables are divided into independent variables and one dependent variable, which are as follows:

i. The independent variables are: the financial dimension, the internal processing dimension, the users' satisfaction dimension, and the learning and growth dimension.
ii. The dependent variable: the performance of resource planning systems.

13. Research Hypotheses

This research includes five hypotheses, which are as follows:

H1: There are statistically significant differences in the financial dimension from the point of view of users of the systems.
H2: There are statistically significant differences in the internal processing dimension from the point of view of users of the systems.
H3: There are statistically significant differences in the user's satisfaction dimension from the point of view of users of the systems.
H4: There are statistically significant differences in the learning and growth dimension from the point of view of users of the systems.

14. Research Tool

The questionnaire was designed after reviewing many papers and previous literature related to the use of the balanced scorecard model to evaluate the performance of ERP systems. The questionnaire included the following four dimensions:

i. The financial dimension included three matrices, as each matrix contained three statements, so that the total number of statements for this dimension was nine.
ii. The internal processing dimension. It included three matrices: the quality matrix, which contained six statements, the efficiency matrix, which contained four statements, and the support matrix, which contained nine statements, so that the total number of statements for this dimension was nineteen.
iii. The user satisfaction dimension included two matrices, the satisfaction matrix, which contained five statements, and the service matrix, which contained five statements, so the total number of statements for this dimension was ten statements.
iv. The learning and growth dimension included two matrices: training, which contained five statements, and the innovation matrix, which contained three statements, so that the total number of statements for this dimension was eight.

The questionnaire was presented to seven academic and experienced arbitrators working on ERP systems. This is to ensure the apparent validity of the study tool and the appropriateness of the statements with the dimensions. Where their notes were taken to modify some statements based on their recommendations, and the five Likert scale was used in the design of the questionnaire and to evaluate the users' responses to the system, and the arithmetic means and standard deviations of the statements were calculated to assess the four dimensions [49]. The degrees of approval are for calculating the period between one dimension and another using the following equation [50]:

Score Interval = (Maximum Score–Minimum Score) /Number of levels … (1)
= (5-1) / 5 = 0.8

So, the degree of agreement that is less than 1.8 falls under the degree of strongly disagree, the period between 1.8 and less than 2.6 falls under the degree of disagree, the period between 2.6 and less than 3.4 falls under the degree of neutral, and the period between 3.4 and less than 4.2 falls under the degree of agree. The period between 4.2 and 5 falls under strongly agree.

Weight has been given to the four-dimensional matrices depending on their number of statements of each dimension to represent in total the overall performance of the resource planning systems as shown in Table 1. The matrix in the financial dimension and the internal processing dimension got a weight of 0.333, and the user's satisfaction dimension and learning and growth dimension got a weight of 0.5. This is done using the following equations:

$$\text{Dimension} = \sum_{i=1}^{n} \text{Weightage of matrix (i)} * \text{Score of matrix(i)} \quad \dots (2)$$

$$\text{Overall performance} = \frac{\sum_{i=1}^{4} performance\ (Pi)}{i} \quad \dots (3)$$

Where:
n = number of matrices
i = dimension number
P_i = dimension performance

Table 1. Weights of the four-dimensional matrices

No	Dimension	Matrix	No of statements	Weight
1	Finance	Performance	3	0.333
		Reports analysis	3	
		Planning	3	
2	Internal processing	Quality	6	0.333
		Efficiency	4	
		Support	9	
3	User satisfaction	Satisfaction	5	0.5
		Service	5	
4	Learning and growth	learning and growth	3	0.5
		Innovation	3	

15. Populations and Sample Research

The research population consisted of users of resource planning systems for several public institutions. The random sample was determined by adopting the research population of up to 5000 users with a confidence level of 95% and an error rate of 5%, after which the sample size was calculated using equation 4 [51]. To calculate the highest sample size n0 at 95% confidence level and the

corresponding value z = 1.96 with the percentage probability of the responders' p% = 50%, the percentage of non-responders q% = 50% and the error rate e = 5%, it was as follows:

$$n_0 = (\%p*q\%)*(z/e\%)^2 \quad \ldots(4)$$
$$= (0.5*0.5)*(1.96/0.05)^2 = 384$$

By substituting in equation 5 to calculate the minimum size of the current research population, which is N = 5000.

$$N_{adj} = n_0/ [1+ (n_0/N)] \quad \ldots(5)$$
$$= 384/ [1+ (384/5000)] = 356$$

The data was collected from the point of view of the employees, the actual users of the systems, by using the research tool, which is a questionnaire, with the numbers of a letter briefly explaining the purpose of this research and the request for participation. The questionnaire was distributed to 500 users. 390 questionnaires were retrieved, 8 questionnaires were excluded for lack of answers, and 382 questionnaires were analyzed.

Cronbach's alpha coefficient was used to check the consistency of the internal consistency of the scale, and the results are shown in Table 2. The results show that the Cronbach's alpha coefficient for all terms is 0.975, which is acceptable because it is higher than 0.7 [52]. The highest value for the user satisfaction dimension was 0.949 and the lowest value for the financial dimension was 0.920, and this indicates the acceptance of the reliability coefficient of the study tool and the validity of the data for analysis.

Table 2. Values of the internal consistency of the questionnaire

Dimension	Matrix	No of statements	Overall
ERP system	Finance	0.920	0.975
	Reports and analysis	0.945	
	Planning	0.949	
	Internal processing	0.936	

Table 3 shows the results of the three general questions at the beginning of the questionnaire, and their purpose is to collect some information to help understand the analysis of the questionnaire statements. The first question: did you receive training in ERP systems? Many of the users did not receive training, and they constituted 75.9% of the 290 users, while 24.1% of the 92 users were trained in their field of work. The second question is: what is the period of your use of resource planning systems? The results showed that the period of use of the resource planning system is less than a year, with a percentage of 38.7% of 148 users, while the period of use was from one to three years, with a percentage of 37.2% of 142 users, and there are 24.1% of 92 who used the resource planning system for more than three years. The third question is: What is your level of computer skills? The results showed that 62.9% of 240 users had an excellent level of computer skills, and they represented most respondents, while 36.6% of 140 users had a moderate level.

Table 3. Frequencies and percentages of general questions

No	Question	Type	Frequency	Percentage
1	Did you receive training in ERP systems?	No	290	75.9
		Yes	92	24.1
2	What is the period of your use of resource planning systems?	Less than one year	148	38.7
		1-3 years	142	37.2
		3 years and above	92	24.1
3	What is your level of computer skills?	Excellent	240	62.9
		Average	140	36.6
		Weak	2	0.5

Table 4 shows the percentages and arithmetic averages of the four dimensions and their matrices. The first dimension measures the efficiency of the financial performance of the resource planning systems through three matrices (performance, report analysis, and planning). The results indicate that the average of the internal processing dimension is 3.38 and the standard deviation was 0.733 with a neutral degree.

The second dimension measures the effectiveness of the internal processing of the resource planning systems through three matrices (quality, efficiency, and support). The results indicate that the average of the internal processing dimension is 3.20 and the standard deviation was 0.907 with a neutral degree. We conclude that the internal processing faced several obstacles that contributed to reducing their efficiency, namely the inability to exchange information between systems; it is not possible to make any modifications to the system; it takes a long time to complete the tasks; and its outputs are not flexible.

The third-dimension measures users' satisfaction through two matrices, the first being satisfaction, which included five statements, and the second matrix, service, which included five statements. The results indicate that the average of the users' satisfaction dimension is 3.38 and the standard deviation was 0.733 with a neutral degree. We conclude that the ERP systems did not receive good acceptance among users and that there are obstacles that hinder their satisfaction, including the slow system and complexity of procedures. And that the services provided by the systems are slow and

cannot complete the user's tasks in the required time.

The fourth-dimension measures learning and growth through two matrices; the first is training, and the second matrix is innovation. The average of this dimension is 3.02, with a standard deviation of 0.994. We conclude that the level of training was not sufficient because the number of those who did not receive training courses is greater than those who received training courses, because they have a role in raising the capabilities and skills of the user and clarifying the purpose of the system that have an impact in creating ideas and innovations that contribute to improving performance.

Table 4. Percentages and arithmetic averages of the four dimensions and their matrices

Dimension	Matrix				
	No	Degree of agreement	Degree	Average	Standard deviation
Finance-Neutral	1	Performance: moderate	3.38/5= 0.676	3.38	0.994
	2	Reports analysis: moderate	3.34/5= 0.668	3.34	0.937
	3	Planning: moderate	3.41/5= 0.682	3.41	0.882
	Average of finance dimension			**3.38**	**0.733**
Internal processing-Neutral	1	Quality: moderate	3.21/5=0.642	3.21	1.012
	2	Efficiency: moderate	3.40/5= 0.680	3.40	0.943
	3	Support: moderate	3.11/5= 0.622	3.11	1.018
	Average of internal processing			**3.20**	**0.907**
Users satisfaction-Neutral	1	Satisfaction: neutral	3.21/5= 0.642	3.21	1.076
	2	Service: moderate	3.18/5= 0.636	3.18	1.037
	Average of Users Satisfaction			**3.38**	**0.733**
Learning and growth-Neutral	1	Training: neutral	2.97/5= 0.594	2.97	1.153
	2	Innovation: neutral	3.34/5= 0.668	3.34	0.937
	Average of Learning and growth			**3.02**	**0.944**

15. Hypotheses Test

The one-sample T-test was used at the level of the arithmetic average of the corresponding degree, which is 3 (average level) and represents the weighted average, to test the first four hypotheses of this research, as shown in Table 5.

Hypothesis H1: There are statistically significant differences in the financial dimension from the point of view of users of the systems. There are statistically significant differences in the financial dimension. The value of the significance level is 0.000, indicating that there are statistically significant differences at the level of 0.05. This means that the financial dimension has an impact on the strategic goals of resource planning systems from the users' point of view, as the good use of financial resources in developing them and strengthening control over them contributes to achieving the desired goals.

Hypothesis H2: There are statistically significant differences in the internal processing dimension from the point of view of users of the systems. The value of the significance level is 0.000, which indicates that there are statistically significant differences at the level of 0.05. This indicates that the internal processing dimension has an impact on the strategic objectives of the resource planning systems from the users' point of view. Where the systems need follow-up and continuous improvement to obtain the required quality and flexibility in extracting information, with the necessary support to benefit from the feedback to achieve the benefits of the systems successfully.

Hypothesis H3: There are statistically significant differences in the user's satisfaction dimension from the point of view of users of the systems. The value of the significance level is 0.003, and this indicates that there are statistically significant differences at the level of 0.05. This indicates that user satisfaction has an effective role in improving performance depending on the extent of acceptance and satisfaction according to users' opinions of the systems.

Hypothesis H4: There are statistically significant differences in the learning and growth dimension from the point of view of users of the systems. The value of the significance level is 0.709, and this indicates that there are no statistically significant differences at the level of 0.05 for the learning and growth dimension. This confirms that the learning and growth dimension did not affect the performance of users in achieving the strategic goals because 76% of the respondents did not receive training.

Table 5. Results of the one-sample T–test of questionnaire dimensions

Hypothesis	T	Degree of freedom	Sig.	Differences average	Confidence level 95% of the differences	
					Lower	Higher
H1	7.20	381	.000	.382	.278	.487
H2	4.04	381	.000	.207	.106	.309
H3	2.98	381	.003	.189	.063	.314
H4	.374	381	.709	.025	-.109	.160
Test level value = 3						

16. Balanced Scorecard Model Analysis

The weights of the four dimensions of a balanced scorecard model were calculated as follows:

Performance for the financial dimension: To assess the performance of the financial dimension of resource planning systems, the weights of the three-dimension matrices that represent the indicators of this dimension were relied upon to describe the capabilities of the financial systems. Thus, the indicators of this dimension are performance, report analysis, and planning, and each of them has a weight of 0.333. Table 6 shows the degree of this dimension is calculated using Equation 2.

The financial dimension contains three matrices, so each matrix has 1/3 = 0.333 weight.

Performance (financial dimension)
= 0.333*0.682 + 0.333*0.668 + 0.333*0.676
= 0.227 + 0.222 +0.225
= 0.674

It is clear from the results that the financial performance of resource planning systems according to the performance matrix indicator has reached 67.6%, the reporting and analysis matrix indicator has reached 66.8%, and the planning matrix indicator has reached 68.2%, and that these indicators have not reached the desired goal, and the overall performance for this dimension has reached 67.4%. This is due to the inability of the systems to improve the efficiency of financial operations to provide effective outputs and exploit all available financial resources.

Table 6. Financial dimension results

Dimension	Strategic goals	Indicator	Matrix degree	Targeted value
Finance	Budget credibility	performance	%67.6	%100
	Inclusiveness and transparency	Reports and analysis	%66.8	
	Traceability and censorship	Planning	%68.2	
Financial dimension performance: 67.4%				

Using the balanced scorecard software package, Fig. 2 shows that the financial performance indicator is at a rate of 67.4%, which indicates that it has not reached the target area in green, which indicates that it needs to intensify efforts to the level of its operations and raise its efficiency to reach the required goals in this dimension.

Fig. 2. Financial dimension performance

Performance for internal processing: The weights of its three matrices are quality, efficiency, and support, and it is 0.333 for each one. Table 7 shows the performance results. The degree of this dimension was calculated using Equation 2. The internal processing dimension contains three matrices, so each matrix has 1/3 = 0.333 weight.

Performance (internal processing)
= 0.333*0.622 + 0.333*0.680 + 0.333*0.642
= 0.207 + 0.226 +0.213
= 0.646

It is clear from the results that the performance of the internal processes according to the quality indicator has reached 64.2%, the efficiency indicator has reached 68%, and the support indicator has reached 62.2%, and thus did not reach the target to be achieved, and the overall performance of this dimension has reached 64.6%. This is due to the low level of continuous follow-up to improve its services and the lack of an alternative plan to face any obstacles that may occur during work, which in turn affects the efficiency of the operational level of systems operations.

Table 7. Internal processing dimension results

Dimension	Strategic goals	Indicator	Matrix degree	Targeted value
Internal processing	Productivity improvement	Quality	%64.2	%100
	Flexibility in sharing information	Efficiency	%68	
	User Support	Support	%62.2	
Internal processing dimension performance: 64.6%				

Fig. 3 shows the level of performance of the internal processing dimension, where the indicator shows that it did not reach the target area in green and its stability in the yellow area at a value of 64.6%, which indicates the need to increase support and follow-up to ensure raising the quality level to earn the user's acceptance.

Fig. 3. Internal processing performance

Performance for the user's satisfaction: Two weights were relied on for this dimension: satisfaction and service, and each of them had a weight of 0.5 to calculate the degree of the dimension. Table 8 shows the performance results for the user's satisfaction dimension. The score for this dimension was calculated using Equation 2.

The customer satisfaction dimension contains three matrices, so each matrix has 1/2 = 0.5 weight.

Performance (customer satisfaction)
=0.5*0.636 * 0.5*0.642
= 0.318 + 0.321
= 0.639

It is clear from the results that the performance of the dimension of user satisfaction according to the service indicator reached 64.2%, and the satisfaction indicator reached 63.2%, and thus they did not reach the goal to be achieved, and the overall performance of this dimension is 63.9%. This is due to a decrease in the level of users' satisfaction with the systems as a result of their inability to meet the needs of users due to the difficulty in implementing system procedures and slow speed.

Table 8. User satisfaction dimension results

Dimension	Strategic goals	Indicator	Matrix degree	Targeted value
Customer satisfaction	Providing information	Service	%64.2	%100
	Earing satisfaction	Satisfaction	%63.6	
Customer satisfaction dimension performance: 63.9%				

Fig. 4 shows the level of performance after users' satisfaction for the resource planning systems located in the yellow area with a value of 64% and not reaching the green target area, which indicates that there is dissatisfaction on the part of users with the performance of these systems, so it is necessary to focus on the users and ensure users' satisfaction to reduce resistance to the change process.

Fig. 4. Users' satisfaction performance

Performance for learning and growth: To evaluate the performance of the learning and growth dimension, the weights of the two matrices, training and innovation, are 0.5 for each one. The degree of this dimension was calculated using Equation 2.

The learning growth dimension contains three matrices, so each matrix has 1/2 = 0.5 weight.

Performance (learning growth)
=0.5*0.608 + 0.5*0.594
= 0.304 + 0.297
= 0.601

The results show that the performance of the learning and growth dimension according to the training indicator has reached 59.4% and the innovation indicator has reached 60.8%, while it has not reached the target to be achieved, and the overall performance for this dimension has reached 60.1%.

Table 9. Learning and growth dimension results

Dimension	Strategic goals	Indicator	Matrix degree	Targeted value
Learning and growth	Improving users capabilities	Training	%59.4	%100
	Motivate to develop	Innovation	%60.8	
Learning and growth dimension performance: %60.1				

Fig. 5 shows the performance of the learning and growth dimension, which is the lowest dimension compared to the other dimensions, as its performance indicator is in the yellow zone with a value of 60%.

Fig. 5. learning and growth performance

Overall performance of the dimensions: the results of calculating the total performance of the four dimensions of resource planning systems by applying Equation 3 indicate that it has reached 64.0%.

$$\text{Overall Performance} = \frac{0.601+0.639+0.647+0.674}{4}$$

= 0.640

This indicates a low level of systems performance due to their weak ability to issue and analyze reports and the lack of adequate support to address and follow up on the problems faced by the users, which had a negative impact on the quality of services that the systems could provide. Also, poor training contributed to poor overall performance through failure to promote the development of knowledge culture and awareness of the basic concepts of systems and their benefits in reducing resistance and raising users' acceptance.

Fig. 6 shows that the overall performance level of the systems is in the yellow area with a value of 64% and that it needs a lot of follow-up and evaluation to reach the target area in green.

Fig. 6. Overall performance indicator of ERP systems

Based on the results and equations of the balanced scorecard model, the indicators of the four dimensions of the balanced scorecard model and their appearance in yellow give a quick answer to the decision makers.

17. Conclusion and Future work

To assess the performance of ERP systems, data was collected from 382 respondents through a questionnaire designed for this purpose, and to answer the first question of the research, " What is the impact of resource planning systems on the financial dimension from the point of view of users of the systems?" The results showed an impact of resource planning systems on financial performance. As the benefits of the systems have not been utilized in improving financial performance to achieve the objectives thereof, there has been a decline in report analysis and planning.

To answer the second question, "What is the impact of resource planning systems on the internal processing dimension from the point of view of users of the systems?" The results showed that there is an impact of resource planning systems on the performance of internal processing, which indicates a deficiency in the quality and efficiency of the systems for internal processing and a lack of necessary support in the event of malfunctions or problems that may hinder the completion of tasks, and that they do not meet the needs of users.

To answer the third question, "What is the impact of resource planning systems on users' satisfaction from the point of view of users of the systems?" The results showed an impact of resource planning systems on the performance of the users' satisfaction dimension, which indicates that the systems did not achieve a high level of satisfaction due to the lack of communication between senior management, support, and users, which caused a low level of user satisfaction.

To answer the fourth question, "What is the impact of resource planning systems on learning and growth from the point of view of users of the systems?" The results showed an impact of resource planning systems on the performance of the learning and growth dimension, which indicates that the systems need more training and education to raise the level of users' skills and give them opportunities to share their suggestions and ideas to enhance their satisfaction.

Based on the results of this research, the proposed future studies are to conduct similar research annually by increasing samples to monitor the implementation of the ERP system using the balanced scorecard. Also, conduct research to evaluate the quality of training courses and conduct research to determine the most important factors affecting ERP systems.

18. Recommendations

Through the results of this research paper, the recommendations are as follows:

i. Consolidating the concept of resource planning systems more for users and showing its benefits to reach the expected results from its implementation.
ii. Developing the methods of resource planning systems in a way that contributes to serving the users and improving performance.
iii. Paying attention to the users and communicating with them closely to know the obstacles facing the systems.
iv. Providing competencies that can provide consultations to users while intensifying training courses for them.
v. Keeping abreast of new concepts in the process of re-engineering operations that are commensurate with the nature of the work is of importance in the success of the implementation process.

vi. Conducting periodic evaluation of systems to show strengths, develop them, and reduce weaknesses.

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Contribution of Individual Authors to the Creation of a Scientific Article (Ghostwriting Policy)

The author contributed in the present research, at all stages from the formulation of the problem to the final findings and solution.

Sources of Funding for Research Presented in a Scientific Article or Scientific Article Itself

No funding was received for conducting this study.

Conflict of Interest

The author has no conflict of interest to declare that is relevant to the content of this article.