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Sabri Saeed Mohammed Al-shaibany

Aljanad University for Science
and Technology, Yemen

Lina Ali Abdulrab Radman

University of Science and Technology
Aden, Yemen

Basheer A. Al-Tayar

Aljanad University for Science and
Technology, Taiz University, Yemen

Amgad S. D. Khaled

Aljanad University for Science
and Technology, Yemen

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Amgad S. D. Khaled

Aljanad University for Science
and Technology, Yemen

Abstract

This research investigates the impact of institutional determinants on the value derived from Enterprise Resource Planning (ERP) systems. A descriptive-analytical methodology was adopted, utilizing interviews and questionnaires to identify and interpret the key factors influencing ERP effectiveness. The interviews focused on users' backgrounds, locations, and experiences to determine critical success elements. Structured questionnaires, specifically designed for the ERP system at the University of Science and Technology (UST), were administered to 84 users across the main campus in Aden and branch campuses in Taiz, Hadramout, and Marib, Yemen. A five-point Likert scale was employed to measure responses, and the data was analyzed using SPSS. The findings reveal that ERP systems significantly enhance the value delivered at UST.

Keywords: ERP, Value added, Science and Technology University

Introduction

The current century is marked by significant advancements across various fields, with information technology standing out as one of the most transformative. This progress has notably impacted numerous disciplines, including education, where technology has become a key driver of change in today's world. The intensifying competition has pushed institutions to leverage every possible tool to gain a competitive edge particularly through information systems [1], [2].

This transformation influences both individuals and organizations, positioning technology as a critical enabler of strategic success. It supports diverse academic and administrative needs by ensuring access to timely and accurate information across all levels. Higher education institutions, in particular, have not remained isolated from this shift. The goal is no longer limited to generating accurate data, but to effectively integrate that data into decision-making processes to enhance output quality and efficiency. However, private universities have recently faced mounting challenges, such as unreliable data and redundant information, which hinder their ability to thrive in a competitive and evolving educational landscape. These issues emerged due to reliance on traditional systems and software such as ORACLE and the Asset system, which operate as closed, standalone solutions. These systems depend solely on internal university data, lacking integration or connectivity with external sources. Additionally, they are built on separate programs and applications for each individual process, resulting in a lack of comprehensive information integration. For example, to improve access to information and the effectiveness of the workflow, it is considered an encouraging reason for the implementation of an ERP system. Moreover, there are other reasons to think about ERP which is the ability to improve controls, the ability of enterprise owners to use this system easily and conveniently, to help with individual performance and finally to meet the expectations of senior enterprise owners, and clearly education is one of those challenges. Universities represent unique and complex environments that are well-suited for the implementation of Enterprise Resource Planning (ERP) systems. However, the successful deployment of such systems necessitates the use of a systematic and comprehensive assessment tool. This research aims to examine the key factors considered in the study,

present the theoretical framework, and outline the proposed hypotheses. It also details the methodology, analyzes the results, addresses the research question, and concludes with key findings

Research Problem

Although universities use a variety of information systems to support their different administrative levels, such as systems for processing operations, these systems often lack consistency and integration between internal units (like departments) and external parties (such as customers). Researchers and practitioners agree that user satisfaction with information systems is a fundamental measure of their effectiveness. In response to the need for modernization and better integration of universities' administrative functions [3], [4], adopting the most effective methodologies is essential for gaining a strategic advantage. Higher education has long been a leading advocate and early adopter of emerging technologies. In pursuit of this role, many institutions have implemented Enterprise Resource Planning (ERP) systems, despite their reputation for being costly, complex, and risky. These systems are often assessed using outdated evaluation methods, highlighting a critical need to modernize how ERP performance and integration are measured across all operational processes.

Furthermore, numerous barriers hinder innovation, particularly within small and medium enterprises and in developing countries. These include a shortage of quality information, limited access to advanced technology, and a lack of qualified system consultants [5], [6]. To address these challenges, educational institutions have embraced various strategies and change initiatives aimed at improving internal efficiency. Research indicates a positive correlation between IT investments and organizational performance. Therefore, it is essential to investigate the factors that influence the successful adoption and utilization of ERP systems, not just from a technological perspective, but also by examining user involvement and internal processes, which are often overlooked yet critical to success.

Based on the above, the problem of this research can be formulated in the following questions:

- Does ERP Systems' (user satisfaction, complexity, training, knowledge sharing, senior management support) have an impact on added Value at the University of Science and Technology.

Objectives

The main objective of this study is to determine the extent of the impact of institutional factors on the added value provided by the system to the university in the main center and its branches.

Literature review

Implementing an ERP system represents a major strategic investment and a complex challenge for any organization. Selecting the appropriate system is critical, as an incorrect choice or poor implementation can negatively affect the company's overall performance [7]. According to the authors in [8], factors such as personal motivation, system usability, and expected return on investment are essential in guiding the decision-making process for ERP system development. Furthermore, a study in [9] assessed the impact of ERP adoption on the stock prices of industrial firms, revealing that the implementation of ERP systems significantly influences their market valuation.

There is a positive correlation between ERP adoption and effective project management. A study by [10] demonstrated that implementing ERP systems in hospital management led to increased efficiency, reduced failure rates, and improved project quality. In broader organizational contexts, ERP adoption, motivated by critical success factors and supportive environmental conditions has driven significant innovations in operations and management, including improved organizational structures and administrative practices [11]. Furthermore, user satisfaction is influenced by system quality, process quality, training, and actual system use. These factors also positively impact behavioral intention and individual performance outcomes [12]. Additionally, both system quality and training have a direct positive effect on the intention to use ERP systems.

ERP system utilization is significantly influenced by factors such as training, user satisfaction, and management support. According to [13], the implementation of ERP systems has greatly enhanced both the financial and non-financial performance of SMEs in Saudi Arabia. In [14], the authors examined organizational readiness and pre-implementation attitudes, revealing that employee attitudes are a critical determinant of ERP implementation success or failure. Furthermore, organizational culture can

pose various challenges during implementation, potentially hindering the effectiveness of ERP adoption [15].

The growing reliance on ERP systems within higher education organizations highlights the need to study the critical success factors (CSFs) that influence performance. While these factors vary, the primary ones include top management support, user training and education, project management, technical infrastructure, business process reengineering, and consultant support [16]. Additional important elements identified are vendor support, thorough software analysis and testing, and clear software selection processes, as noted in [17]. Although most small and medium-sized enterprises implement these CSFs, differences exist; for instance, some organizations do not consider standardized infrastructure and clear scoping as critical success factors [18].

Authors in [19] examined best implementation practices, critical success factors, benefits realized, and challenges faced in the Middle East region. They found that most enterprises in Saudi Arabia encounter significant time and cost overruns during ERP implementation. Conversely, findings in [20] indicated that greater system benefits are closely linked to positive user adoption, while user experience did not significantly affect the relationship between benefits and adaptability. Although small and medium-sized enterprises acknowledge the advantages of ERP systems, especially for managing heterogeneous data, their business intelligence capabilities remain largely underutilized [21].

Research Framework

This study adopts a framework similar to those developed by researchers such as [22], [23], [24], and [25]. It investigates the relationship between contingency factors and the added value in private universities, using the University of Science and Technology as a case study. Figure 1 illustrates the study factors, which are divided into two groups: the first group includes independent variables—support of senior management, knowledge sharing, satisfaction of system users, training, and complexity; the second group is the dependent variable, which is the added value.

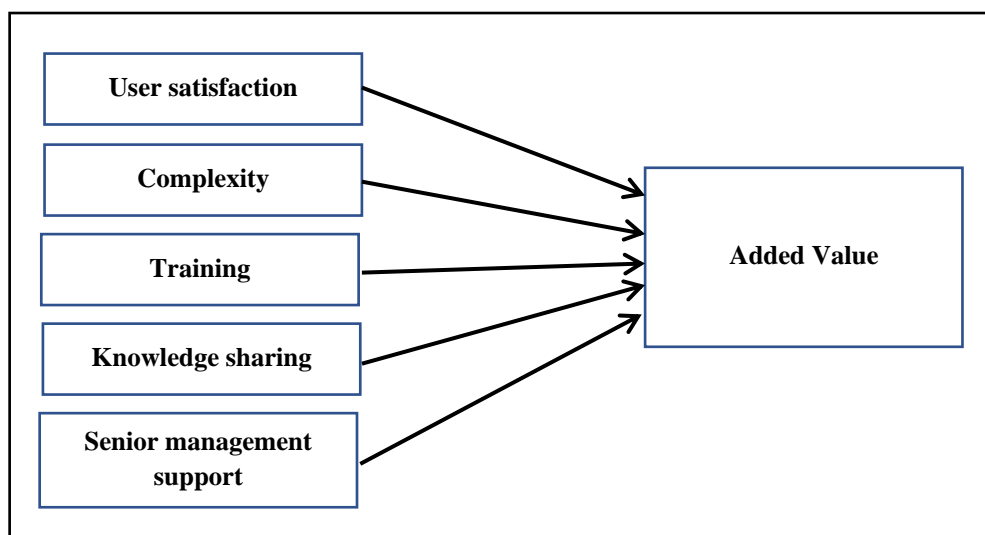


Figure 1. Research Framework

Hypotheses

H1: *ERP Systems' has an impact on added Value at the University of Science and Technology*

H1a: *user satisfaction has an impact on added Value at the University of Science and Technology*

H1b: *complexity has an impact on added Value at the University of Science and Technology*

H1c: *Training has an impact on added Value at the University of Science and Technology*

H1d: *knowledge sharing has an impact on added Value at the University of Science and Technology*

H1e: *Senior Management Support has an impact on added Value at the University of Science and Technology*

Methodology

This research investigates the impact of institutional determinants on the value of ERP systems at the main campus of the University of Science and Technology in Aden and its campuses in Taiz, Hadramout, and Marib, Yemen. The research utilizes a descriptive analytical methodology, collecting data using interviews and questionnaires to elucidate and interpret study factors. Interviews examined user history, location, and experience to ascertain critical elements affecting ERP system success. Structured

questionnaires, tailored for the ERP and employing a five-point Likert scale, were disseminated to 84 users. The duration of the study differed by branch according to the ERP implementation date. In light of the intricate theoretical framework and research setting, interviews fulfilled an exploratory function, whilst questionnaires evaluated the study's hypotheses. This research delineates the study population and sample, outlines field study protocols for primary data collecting, describes the statistical methods employed for data analysis, and presents insights into ERP system performance in Yemeni private universities, particularly at the University of Science and Technology. Table 1 delineates the study population and its dispersion.

Study Sample

The study sample consisted of system users and senior management personnel who utilize system-generated reports, regardless of their physical location. Participants were selected from both the university's main campus and its branch campuses. The total sample size was 120 individuals. Out of these, the study instrument was distributed to 100 users across upper, middle, and lower administrative levels, with a total of 65 respondents.

Table 1.
study population and its dispersion.

Category	Number	Percentage
University Presidency	3	0.51%
Financial Management	25	4.24%
Human Resources	8	1.36%
Registration Management	18	3.06%
Medicine and Health Sciences	5	0.85%
Medicine and Health Sciences Faculty	250	42.44%
Engineering and Computing Faculty	180	30.56%
Administrative Sciences Faculty	100	16.98%
Total	589	

Instruments

The researcher submitted the questionnaire to computing experts at the University of Science and Technology to assess its validity. The experts evaluated the clarity, sincerity, and appropriateness of the questionnaire items, including the relevance of each paragraph to its dimension and the

alignment of standards and dimensions with the study's aims. According to the experts' feedback, a consensus rate of 60% was necessary for each paragraph to be considered valid; paragraphs that did not achieve this criterion were either amended or excluded. The questionnaire was subsequently revised in accordance with the experts recommendations via additions, deletions, or alterations. The finalized questionnaire, validated by subject-matter experts, is presented in its definitive form. Table 2 outlines the study's main axes, corresponding dimensions, and the number of items included under each dimension.

Table 2.

study's main axes, corresponding dimensions, and the number of items included under each dimension

No	Axes	Dimensions	No. of Items
1	Institutional factors	University management support	4
2	Factors associated with the use of the system	Sharing Knowledge	3
		Satisfaction of system users	5
		Training	3
		Complexity	5
3	The added value provided by the system to the university		6
Total			26

Internal Consistency Validity

To assess the validity of the questionnaire items and ensure that no questions weaken the interpretive power of the results, the researcher used the Pearson correlation coefficient to examine the correlation between each dimension and its total score at a significance level of 0.01. Table 3 presents the correlation coefficients for each dimension with the total score of the axis it represents. The results show a strong statistical correlation at the 0.01 significance level between all dimensions and their respective axes. The lowest significant correlation coefficient observed was 0.448 for the institutional factors axis, while the highest was 0.864 for the factors related to system use axis. These findings confirm that all questionnaire items are positively and strongly correlated with their dimensions and are statistically significant at the 0.05 level. This indicates that all dimensions in the study

instrument appropriately belong to their respective axes and are suitable for the study's purpose, with no items weakening the tool's structural validity.

Table 3.

The correlation coefficients for each dimension with the total score of the axes that it represents

No	Axes	Dimensions	Pearson Correlation Coefficient	Significance level
1	Institutional factors	University management support	0.448	0.00
2	Factors associated with the use of the system	Sharing Knowledge	0.785	0.00
		Satisfaction of system users	0.864	0.00
		Training	0.827	0.00
		Complexity	0.481	0.00
		Customer satisfaction (students)	0.797	0.00
3	The added value provided by the system to the university		0.830	0.00

Reliability

Reliability refers to internal consistency, ensuring that each item in the questionnaire appropriately corresponds to the dimension it is intended to measure. To assess this, the Cronbach's Alpha coefficient was calculated to determine the correlation between each item and its respective dimension. This analysis was conducted to verify the stability of the data collection instrument and the reliability of the respondents' answers to the questionnaire items. If the Cronbach's Alpha coefficient is below 0.60, the reliability of the questionnaire is considered weak. A value between 0.60 and 0.70 indicates acceptable reliability, while a range of 0.70 to 0.80 reflects good reliability. Values exceeding 0.80 denote a high level of reliability. Table 4 presents the results of the Cronbach's Alpha test for the study instrument.

Table 4.*The results of the Cronbach's Alpha test for the study*

Dimensions	Score of Alpha stability	Alpha Score 1/2
University management support	0.90	95%
Sharing Knowledge	0.90	95%
Satisfaction of system users	0.90	95%
Training	0.90	95%
Complexity	0.90	95%
Customer satisfaction (students)	0.90	95%
The added value provided by the system to the university	0.90	95%
All Survey Items	0.93%	96.7%

As shown in the table above, the reliability coefficients (Cronbach's Alpha) for all dimensions of the study ranged between 0.90 and 0.91. Furthermore, the overall Cronbach's Alpha value for the entire questionnaire reached 0.94. Since this value exceeds 0.80, it indicates a high level of reliability. These results demonstrate that the study instrument possesses strong internal consistency and stability across its items. The high reliability coefficients suggest that the questionnaire items are well-constructed and cohesive, and that the responses exhibit a high degree of homogeneity and consistency. Consequently, the results derived from this instrument can be considered reliable and generalizable to the broader research population..

Respondent's profile

Table 5 presents the distribution of the study sample based on various demographic variables. Regarding gender, the sample included 32 males (65.3%) and 17 females (34.7%). This distribution is considered typical, with male respondents outnumbering females. In terms of job position, the majority of respondents were from middle management, representing 71.4% of the sample (35 individuals). This was followed by lower management, accounting for 20.4% (10 individuals), and senior management, comprising 8.2% (4 individuals).

With respect to geographic distribution, the Taiz branch had the highest representation, accounting for 49.0% of the sample (24 individuals), followed by the Aden branch with 36.7% (18 respondents). The Marib

branch ranked third with 8.2% (4 respondents), while the Hadramout branch accounted for the lowest proportion at 6.1% (3 respondents). Regarding academic qualifications, respondents holding a bachelor's degree constituted the largest group at 61.2% (30 respondents). This was followed by those with a master's degree, comprising 28.6% (14 respondents). The frequency of respondents holding a doctoral degree was 5, representing 10.2% of the sample. These results suggest that the majority of respondents possess higher education qualifications, which enhances the credibility and relevance of the research findings due to their academic background. In terms of years of experience, the highest proportion of respondents had less than 5 years of experience, accounting for 32.7% (16 respondents). This was followed by those with 5 to 10 years of experience at 28.6% (14 respondents), 11 to 15 years at 18.4% (9 respondents), and 16 to 20 years at 14.3% (7 respondents). Respondents with more than 20 years of experience represented the smallest group at 6.1% (3 respondents).

According to the management variable, the Registration Department ranked first, representing 28.6% of the total sample with 14 respondents. The College of Medicine and Health Sciences followed in second place, comprising 22.4% of the sample with 11 respondents. The Human Resources Department came in sixth place, accounting for 6.1% with 3 respondents. The Faculty of Administrative Sciences and Humanities ranked seventh, representing 4.1% with 2 respondents. The category with the lowest representation was the University Presidency, with 2.0% and only 1 individual from the total sample.

Table 5.

Distribution of the study sample based on various demographic variables

Demographic	Frequency	Percentage
Gender		
Males	32	65.3
Female	17	34.7
Career Level		
Lower Management	10	20.4
Middle Management	35	71.4
Senior Management	4	8.2
Branch		
Aden	18	36.7

Demographic	Frequency	Percentage
Taiz	24	49
Hadhramaut	3	6.1
Marib	4	8.2
Qualification		
Bachelor	30	61.2
Master	14	28.6
Doctor	5	10.2
Years of Experience		
Less than 5	16	32.7
from 5 to 10	14	28.6
From 11 To 15	9	18.4
From 16 To 20	7	14.3
More than 20	3	6.1
Management		
University Presidency	1	2
Financial Management	10	20.4
Registration Management	14	28.6
Medicine and Health Sciences Faculty	11	22.4
Human Resources	4	8.2
Engineering and Computing Faculty	7	14.3
Faculty of Administrative Sciences	2	4.1
Total	49	100

Hypothesis Testing through regression

The researcher applied regression analysis to test the relationship between ERP system performance and the value added to the organization. This approach helps determine the extent to which the independent variables significantly predict the dependent variable.

Statistical Analysis of the Impact of ERP Systems on Value-Added

To determine whether the ERP system has a statistically significant effect on value-added at a significance level of $\alpha = 0.05$, the researcher employed simple linear regression analysis. The results, presented in Table 6, indicate the following:

- There is a moderate positive correlation between ERP system performance (independent variable) and value-added (dependent variable), with a Pearson correlation coefficient of 0.497, which is statistically significant at the 0.05 level.
- The regression coefficient (B1) for ERP system performance is 0.593, indicating that a one-unit increase in ERP system performance is associated with a 0.593-unit increase in value-added, assuming all other factors remain constant.
- The coefficient of determination (R^2) is 0.247, meaning that 24.7% of the variance in value-added can be explained by the performance of the ERP system, while the remaining 75.3% is attributable to other factors not included in the model.
- The F-statistic value of 15.382 is statistically significant at the 5% level ($p < 0.05$), confirming that the regression model is valid.

These results suggest that ERP system performance has a statistically significant and positive impact on value-added in the university context.

Table 6.

Simple Linear Regression Model Results

Independent Variable	Model Parameter	Standard Error	T-Test (Calculated)	Significance Level (p-value)	Correlation coefficient (R)	coefficient of determination (R^2)	F-Statistic	F Significance
Intercept (A)	1.456	0.628	2.319	0.025	0.497	0.247	15.382	0.000
ERP System Performance (B1)	0.593	0.151	3.922	0.000				

Multivariate Analysis of ERP System Factors

To further examine the impact of factors associated with ERP system, the researcher conducted a multiple linear regression analysis. The independent variables included knowledge sharing, user satisfaction, training, and system complexity, while the dependent variable remained value-added.

According to the results shown in Table 7:

- The overall model demonstrates a strong correlation (Pearson $R = 0.724$) between the independent variables and value-added. The coefficient of determination (R^2) is 0.524, indicating that 52.4% of the variance in value-added can be explained by the combined effect of the independent variables.

- The F-statistic is 9.464, which is significant at the 0.05 level ($p < 0.001$), confirming the overall model validity.
- However, none of the individual predictors—knowledge sharing ($p = 0.729$), user satisfaction ($p = 0.161$), training ($p = 0.644$), complexity ($p = 0.645$) or management support ($p=0.511$) have a statistically significant effect on value-added, as all p-values exceed the 0.05 threshold.

This indicates that while the combined influence of these factors is statistically significant in explaining value-added, no single factor among them individually exerts a statistically significant effect within this model.

Table 7.

Multiple Linear Regression Model Results

Independent Variables	Model Parameters	Standard Error	T-Test (Calculated)	Significance Level (p-value)	R	R ²	F-Statistic	F Significance
Intercept (a)	1.860	0.832	2.235	0.031	0.724	0.524	9.464	0.000
Knowledge Sharing (B1)	0.060	0.171	0.348	0.729				
Satisfaction of System Users (B2)	0.289	0.202	1.426	0.161				
Training (B3)	0.056	0.122	0.465	0.644				
Complexity (B4)	-0.060	0.129	-0.464	0.645				
Management Support (B5)	0.135	0.165	0.746	0.511				

Conclusions

The research finds that Enterprise Resource Planning (ERP) systems have a substantial impact on the value delivered by the University of Science and Technology. The simple regression analysis confirms a significant positive impact of ERP system on value-added. In contrast, the multiple regression model suggests that although the combined influence of various system-related factors is significant, none of them independently predict value-added at the 5% level. This suggests the need for further exploration of additional variables or interactions among variables that may influence the outcome.

Recommended Actions for Enhancing ERP System Adoption and Effectiveness

- 1- Actively disseminate and encourage the adoption of ERP systems at all administrative levels within the university and its branches to ensure widespread utilization and integration.
- 2- Encourage and adopt user-generated ideas to continuously improve and enrich the ERP system with innovative and practical contributions.
- 3- Establish ERP usage as a standard practice across the university. This behavioral alignment will support institutional leadership in digital transformation and operational efficiency.
- 4- Prioritize ongoing training and professional development to enhance the skills and competencies of ERP system users.
- 5- Organize regular workshops, meetings, and training sessions that promote value-driven engagement. Create platforms where users can share ideas, provide feedback, and participate in relevant decision-making processes.
- 6- Focus on recruiting and retaining skilled ERP users and developers with strong technical expertise and creativity, which will significantly contribute to the system's advancement and effective implementation.
- 7- Ensure the university's organizational structure includes dedicated departments or units focused on ERP system development, support, and continuous improvement.

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