

A Framework for Implementing Information Systems Integration to Optimize Organizational Performance

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Abstract

The primary aim of this study is to investigate the influence of Service Provider Quality (SPQ), System Quality (SQ), Information Quality (IQ), and Training Quality (TQ) on the interconnected aspect of organizational performance known as growth and development (GD). The study examined the influence of information systems (IS) on organisational performance and provided a theory-based technique for conducting research. The theoretical foundation for this study is derived from the widely employed [1]. IS success model in information systems research. The study's framework incorporates several novel elements, drawn from a comprehensive review of both recent and earlier literature, which researchers have utilized to evaluate the dimensions of [1]. In this study, we collected data from a diverse group of 348 individuals representing various industries through a web-based questionnaire. The collected data were subjected to analysis using SPSS. We conducted a multiple regression analysis involving 15 factors to assess several hypotheses regarding the relationship between the independent construct IS effectiveness and the dependent construct organizational performance. Several noteworthy descriptive statistics emerged, which hold significance for management. The study's findings strongly indicate that information systems exert a significant and beneficial influence on organizational performance. To sustain and continually enhance organizational effectiveness, the study recommends that managers periodically scrutinize and assess their information systems.

Keywords:

Information System, Framework, Optimize Performance

1. Introduction and Literature

This study revolves around the convergence of information systems and organizational performance. It's primarily focused on exploring the intricate relationship between information systems and organizational performance, addressing the factors that influence organizational performance to achieve predefined goals and objectives. Additionally, it delves into strategies that organizations can employ to break even, thrive, reach maturity, and ensure survival, all while efficiently satisfying customer needs. The research also examines the utilization of high-quality information for making strategic decisions, allowing organizations to maintain a competitive edge in the global market.

Organizational performance is, in part, contingent upon the effectiveness of information systems. These systems enable organizations to provide services that meet customer expectations, access a broader spectrum of valuable data, adapt to business changes swiftly, and enhance workforce productivity in an efficient manner. As [2] have stated, an information system encompasses all the tools, techniques, and procedures employed by businesses to process data. [3] further emphasized that organizations integrate information systems into their operations to bolster competitiveness, foster growth, and achieve success.

We embrace the definition of Information Systems (IS) provided by [4]. This portrayal of IS characterizes it as a comprehensive system that integrates user engagement with computer hardware, software, manual procedures, analytical models, planning and control instruments, decision-making capabilities, and a database. All of these components are considered when implementing information technology (IT).

Because of this, IS and IT are frequently used interchangeably in research. [5] further emphasized that information systems are not only mechanical but also social systems, underscoring the importance of understanding the soft elements associated with social dynamics in IS implementation.

The term Information Technology, often abbreviated as IT, designates a subset of information systems encompassing computer and telecommunications technology for collecting, storing, retrieving, reproducing, managing, and transmitting information, as defined by ([6] quoted in [7]). Considering the close relationship between the social and technological aspects of IS and IT, it becomes evident that a clear demarcation between the two is not discernible, as noted by [8].

In other words, information systems (IS) have been developed using information technology (IT) to assist individuals in performing various tasks, as highlighted by [9]. This distinction made by the author categorizes information systems into hedonic and utilitarian types. Utilitarian information systems encompass technologies such as Enterprise, Knowledge Management, and E-commerce [9], with the goal of enhancing both individual and organizational performance.

Although information systems research employs various classification methods, it is clear that numerous untapped research avenues remain for future IS studies. These avenues can provide insights into how both managers and academics perceive and leverage established as well as emerging technologies. Many research prospects warrant exploration because the breadth of the domain involving development, utilization, and application of IS by individuals and organizations is too extensive for information systems research [10], there exist abundant research opportunities to explore. The influence of IS on organizational performance is the specific study issue that this study addresses within the field of information systems. The capacity of an organization to take use of the features and advantages provided by IS has emerged as the primary driver of this study, which intends to examine the connection between IS effectiveness and organizational performance. As per [11], the commonly used definition of IS effectiveness is the degree to which a particular information system genuinely contributes to the accomplishment of organizational objectives, i.e., its impact on organizational performance. Contrarily, the concept of organizational performance is an ongoing open research subject with few studies that employ uniform definitions and metrics [12]. A concise definition is offered by [13], stating that Organizational Performance pertains to the degree of success an organization attains in meeting its market-oriented objectives and financial targets. Due to the field's crucial connection to management practices, there are several significant evaluations on performance [14]. [15] argue that the utilization of the management information system has a pronounced positive effect on the performance of the organization "Seven Up Company" in Aba and Port Harcourt, resulting in higher profitability and an expanded market share. [16] conducted a study to investigate how training affects the strategy, information technology management, and organizational performance. The study's results revealed that both IT management and strategy management had a positive and statistically significant impact on the effectiveness of the Sharjah Police departments. In their examination of the organizational policies within the Indonesian Ministry of Defence, [17] provide recommendations regarding the necessity for improved regulations and the implementation of more effective policies concerning supervisory management information systems. They emphasize that user satisfaction has a notably positive effect on organizational performance. Furthermore, the presence of Smart SIM significantly and positively influences organizational performance. Notably, Smart SIM serves as an intermediary factor in the relationship between user satisfaction and organizational performance.

2. Descriptive Statistics

According to Table 1, there are roughly 28% of participating enterprises in the manufacturing sector, followed by commercial businesses/retailers (54%) and services (18%). As can be seen in Table 2, the majority of the businesses in our sample employed more than 150 people, which was to be expected since this was the target market for our study and micro SMEs were unlikely to have used IS. As indicated in Table 3, which provides information on the percentage of employees utilizing the information system in their workplace, it can be observed that 71% of the companies included in our study possessed a workforce proficient in using the IS.

Table 1. Categorization by Occupation

	Frequency	Percent
Manufacturing and construction	107	28.3
Commercial	203	53.7
Services	68	18.0
Total	378	100.0

Table 2. Number of Employees

	Frequency	Percent
<50	150	39.7
50-100	171	45.2
100-200	57	15.1
Total	378	100.0

Table 3. How many staff members make use of the information system?

	Frequency	Percent
< 10%	109	28.8
10-30%	173	45.8
30-50%	96	25.4
Total	378	100.0

Information on respondents' work status, length of employment, and distribution of respondents' IT management of persons in a company is provided in tables 4, 5, and 6. There are 105 responders who are not full-time employees (NO) compared to 273 full-time employees (YES). A sizable percentage of respondents (43.9%) have worked for less than a year, followed by 29.1% for between one and three years, and 27.0% for four or more years. In addition,

44.5% of respondents have one to three years' experience in IT management, 32.3% have more than three years' experience, and 22.2% have less than a year's experience.

Table 4. Do you work for this company on a full-time basis?

	Frequency	Percent
Yes	273	72.2
No	105	27.8
Total	378	100.0

Table 5. How long have you worked for this organisation?

	Frequency	Percent
<1 year	166	43.9
1-3 years	110	29.1
> 3 years	102	27.0
Total	378	100.0

Table 6. How long have you worked as an IT manager in your professional life?

	Frequency	Percent
<1 year	84	22.2
1-3 years	172	45.5
> 3 years	122	32.3
Total	378	100.0

The type of software used in our sample is shown in Table 7. The majority of businesses primarily use e-commerce, either on its own or in conjunction with another corporate technology. The software especially employed by the companies in our sample, Customer Relationship Management (CRM), is less often used than Enterprise Resource Planning (ERP) and Project Management (PM), E- Commerce (EC) and Order Management (OM)

Table 7. What kind of information system does the business employ?

	Frequency	Percent
ERP	66	17.5
SCM	59	15.6
CRM	57	15.1
PM	66	17.5
EC	80	21.2
OM	50	13.2
Total	378	100.0

3. Methodology

We conducted an in-depth examination of the theory and methodologies employed to define the independent and dependent elements within our research framework. In this structural context, we established four core assertions that clarified the link between our distinct dimensions classified as "Information Effectiveness" and our resultant factor, "Organizational Performance." Figure 1 provides a more comprehensive representation of our research model, showcasing the primary dimensions, their associated factors, and their anticipated associations within the dependent construct. The effective information measurements served as the independent variables, while the factors associated with organizational performance were treated as the dependent variable. To assess and quantify potential relationships between the IVs and DV, we conducted a multiple regression analysis. In the next phase, it was imperative to explore the relationships between each independent variable and the factor of organizational performance, as well as to examine the impact of each on the dependent construct.

In order for a corporation to derive both financial and non-financial advantages, it is imperative that the information system is effectively implemented and receives user endorsement [18-20]. A study by [21], focusing on entrepreneurial firms, emphasized that a well-designed system from a technical perspective [22, 23] that aligns with user expectations positively impacts organizational efficiency and overall organizational performance. Furthermore, it is anticipated that a system capable of modernizing company processes and reducing both time and expenses will significantly enhance organizational performance [24]. To confirm the reliability of the measurement scales employed in the study, the items selected for the constructs were primarily adapted from previous research.

All five elements, namely system use (SU), system usefulness (SUE), supply chain management effectiveness (SCM), system acceptance (SA), and business process effectiveness (BPE), can be correlated with the dimension of system quality (SQ).

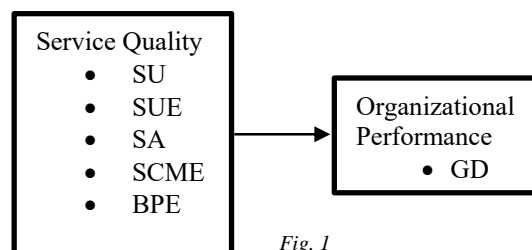


Fig. 1

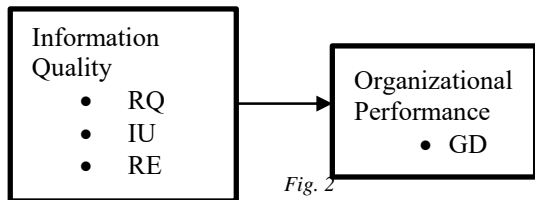
The analysis above led to the formulation of the following claims:

H_a : There is a positive relationship between system quality and organizational performance

Table 8. System quality and organisational performance factors

SQ factors	Growth and development related hypotheses (H _a)
SU	H1a If SU increases, GD will also increase.
SUE	H1b If SUE increases, GD will also increase.
SA	H1c If SA increases, GD will also increase.
BPE	H1d If BPE increases, GD will also increase.
SCME	H1e If SCME increases, GD will also increase.

The effectiveness of reports plays a crucial role in the operational success of companies, as emphasized by studies conducted by [25] and [24]. When reports generated through Information Systems are perceived as being effective, they are expected to have a positive impact on organizational performance.



H_b: There is a positive relationship between information quality and organizational performance

Table 9. Information quality and organisational performance factors

IQ factors	Growth and development related hypotheses (H _b)
RQ	H2a If system RQ increases, GD will also increase.
IU	H2b If IU increases, GD will also increase.
RE	H2c If RE increases, GD will also increase.

As per [1] and [26], and later reaffirmed by [27], SPQ pertains to the level of excellence in services provided by the IT support division. It encompasses various metrics such as responsiveness, dependability, technical proficiency, and the empathy displayed by the IT staff. Research has investigated this construct's connection with organizational performance and found it to yield positive outcomes, as evidenced by studies by [28] and [29]. Within the domain of Service Provider Quality (SPQ), two contributing elements are Service Provider Empathy (SPE) and Service Provider Reliability (SPR).

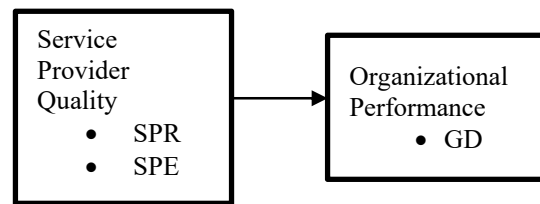


Fig. 3

H_c: There is a positive relationship between Service Provider quality and organizational performance

Table 10. Service Provider's and organisational performance factors

SPQ factors	Growth and development related hypotheses (H _c)
SPE	H3a If SPE increases, GD will also increase.
SPR	H3b If SPR increases, GD will also increase.

In 2002, Irani argued that insufficient training leads to limited stakeholder backing for ERP systems, while [30, 31] presented a contrasting viewpoint, suggesting that training can eliminate all obstacles stemming from technological intricacies. In light of these perspectives, we propose the following research hypotheses:

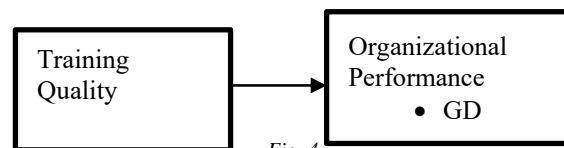


Fig. 4

H_d: There is a positive relationship between Training effectiveness (TE) and organizational performance

Table 11. Factors related to training and organizational performance

Training quality factors	Growth and development related hypotheses (H _d)
TE	H4a If TE increases, GD will also increase.

Regression Analysis

The initial hypothesis aimed to explore the association between the independent construct, referred to as system quality (SQ), and the dependent sub-construct within organizational performance, labeled as growth and development (GD). We used conventional methods to conduct a multiple regression analysis to gauge the suggested model's prediction ability. Following the conventional regression methodology, all independent factors that fell into the category of

system quality were included at the same time in this research.

Collinearity tests were performed using SPSS to evaluate two distinct values: tolerance and VIF. Tolerance is calculated as 1 minus the coefficient of determination (1-R squared) for each to reduce the danger of multicollinearity. The other measurement, VIF (Variance Inflation Factor), which is effectively 1 divided by tolerance, should ideally not exceed a threshold of 10. As shown in Table 16, our collinearity diagnostics confirmed that both tolerance and VIF stayed within acceptable limits. As suggested by [32], one method for evaluating the aforementioned assumptions entails looking at the Normal Probability Plot (P-P) of the Regression Standardised Residual. Upon analyzing Figure 5, we identified no departure from the central rectangle, affirming that the assumptions regarding normality were maintained.

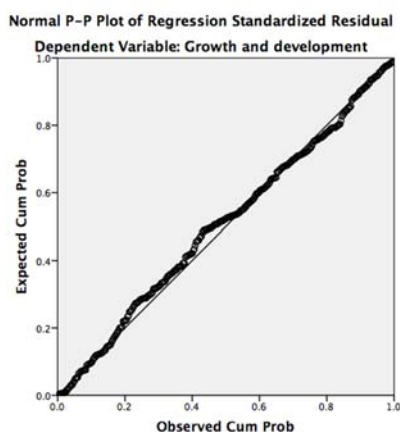


Fig. 5 P-P plot independent factor system quality

Upon examining the individual case details in Table 12, we noted a single instance where our model did not precisely forecast the participants' scores. Following the guidelines presented by [33], it was evident that the max. values for Cook's distance remained well below the threshold of 1. Consequently, no additional steps were necessary to assess the inclusion of this case in the study, as indicated in Table 13.

element, and it refers to the amount of unexplained variability in our model caused by interdependencies among factors. According to [32], it is advised that this value be greater than 0.1

Table 12. Case-wise Diagnostics

Case #	Sd. Residual	Growth and development	Predicted Val.	Residual
295	-3.241	3.22	4.0987	-.87650

Table 13. Residual Statistics

	Min.	Max.	Mean	Sd. Deviation	N
Cooks Distance	.000	.044	.003	.005	378
Centered Leverage Value	.001	.058	.013	.008	378

Testing of hypotheses H_a

Table 14's model summary box showed us that the R² value was 0.930. This suggested that system quality accounted for 93% of the variation in our variable of study growth and development.

Table 14. Model Summary

R.	R Square.	Adjusted R-Square	Sd. Error of the Estimate	Durbin Watson
.964 ^a	.930	.929	.27040	1.908

We referred to the ANOVA findings presented in Table 15 to assess the statistical significance of the outcome.

The multiple R in the population being equal to zero is a hypothesis that is tested using this approach.

Table 15. ANOVA

Model.	SS	df.	Mean-Square	F	Significant
Regression.	358.780	5	71.756	981.363	.000
Residual.	27.200	372	.073		
Total	385.980	377			

Our model achieved statistical significance (with a significance level .000, indicating less than .0005), and as a result, the first proposition was validated. The subsequent step involved the examination of the corresponding hypotheses H_{1a} to H_{1e}. Which of the model's five independent components contributed the most to the dependent

factors? That was our aim. The regression equations must be built using the non-standardized coefficients. We found that "SCM effectiveness" (0.895) had the highest beta value among the values in Table 16, indicating that it considerably contributed to the explanation of growth and development. The system usefulness parameter received the next-highest beta

value, not far behind. However, the remaining elements of this model, such as business process effectiveness, system utilisation, and system

acceptance, had no impact on the growth and development predictions.

Table 16. Coefficients

Model	Unstandardized Coefficients.		Standardized Coefficients.	t.	Significant
	B	Sd. Error	Beta.		
(Constant)	.225	.139		1.615	.107
SU	-.028	.019	-.023	-1.489	.137
SUE	.038	.018	.032	2.070	.039
SCME	.895	.013	.964	69.806	.000
SA	-.006	.020	-.004	-.280	.780
BPE	.016	.010	.023	1.646	.101

Testing of hypotheses H_b

The second hypothesis delved into investigating the association between the independent variable (IV), information quality (IQ), and the related sub-component of organizational performance known as growth and development (GD). We followed conventional procedures for conducting a multiple regression analysis, and the results provided us with the opportunity to proceed with model assessment. Upon scrutinizing the model summary displayed in Table 17, we observed an R-squared value of 0.377, indicating that information quality could explain approximately 37.7% of the variability in our DV, growth and development. To

evaluate the statistical significance of this outcome, we referred to the ANOVA results presented in Table 18, which tested the hypothesis that the population's multiple R equaled to zero. We accepted the second proposition based on the statistical significance of our model (with a significance level of .000, which is less than .0005).

Table 17. Model Summary

R.	R Square.	Adjusted R-Square	Sd. Error of the Estimate	Durbin Watson
.614	.377	.372	.80162	1.620

Table 18. ANOVA

Model.	SS	df.	Mean-Square	F	Significant
Regression	145.649	3	48.550	75.552	.000
Residual	240.332	374	.643		
Total	385.980	377			

Table 19. Coefficients

Model	Unstandardized Coefficients.		Standardized Coefficients.	t.	Significant
	B	Std. Error	Beta		
(Constant)	-.272	.343		-.792	.429
RQ	.903	.061	.606	14.816	.000
IU	.026	.034	.031	.757	.449
RE	.064	.036	.073	1.790	.074

Our objective was to comprehend the impact of each of the three separate elements incorporated within the model on predicting the dependent construct. For comparative purposes, we utilized beta values under standardized coefficients, although un-standardized coefficients were employed when constructing regression equations. Upon examining the beta coefficients in Table 19, it became apparent that the most substantial beta value was linked to report quality, indicating its substantial role in elucidating growth and development. This observation was clear as we examined the beta values in Table 19. Additionally, we noted that two of these components exhibited insignificant values exceeding 0.05.

Testing of hypotheses H_c

The third hypothesis explored the connection between the autonomous aspect of service provider quality and a particular sub-component of organizational performance referred to as "growth and development." After examining the model summary in Table 20, it became apparent that the R-squared value was recorded at 0.314. This data raises the possibility that service provider quality may account for about 31.4% of the variations in growth and development, our dependent variable, that have

been observed. We compared this result's statistical significance to the ANOVA findings in Table 21, which looked at the possibility that the population's multiple R was equal to zero.

The third proposition was accepted because our model has statistical significance 0.000 which is less than 0.05. Following this, we conducted an assessment of the related hypotheses, H3a and H3b. Our aim was to ascertain the primary effects of each independent variable incorporated into the model on the dependent variables. We employed unstandardized coefficients in the process of constructing regression equations. Upon careful examination of the beta values presented in Table 22, it became evident that Service Provider Empathy held the highest beta value at 0.583, indicating that this factor played the most significant role in elucidating growth and development. Only H3a was accepted because we saw that this factor had a sig. value < 0.05.

Table 20. Model Summary

R.	R Square.	Adjusted R-Square	Sd. Error of the Estimate	Durbin Watson
.560	.314	.310	.84034	1.523

Table 21. ANOVA

Model.	SS	df.	Mean-Square	F	Significant
Regression	121.165	2	60.583	85.790	.000
Residual	264.815	375	.706		
Total	385.980	377			

Table 22. Coefficients

Model	Unstandardized Coefficients.		Standardized Coefficients.	t.	Significant
	B	Std. Error	Beta		
(Constant)	1.382	.269		5.148	.000
Service Provider	.010	.048	.009	.207	.836
Service Provider Empathy	.583	.045	.560	13.094	.000

Testing of hypotheses H_a

The fourth hypothesis looked at the relationship between growth and development, a dependent sub-construct linked to organisational performance, and training effectiveness, an independent component. The R-squared value was determined to be 0.747, as was clear from the model description shown in Table

23. This result suggested that training efficacy would be able to account for a sizeable portion exactly 74.7% of variation seen in dependent variable, GD.

Table 23. Model Summary

R.	R Square.	Adjusted R-Square	Sd. Error of the Estimate	Durbin Watson
.864	.747	.746	.50969	1.907

To determine the statistical significance of the result, we conducted an analysis of the ANOVA findings

presented in Table 24. These findings evaluate the hypothesis that the multiple-R value of the population is equal to zero.

Our model demonstrated statistical significance (with a significance level of $\text{sig}=.000$, indicating $p<.0005$), thus confirming the acceptance of the fourth proposition. Details regarding the beta value and the significance value (sig) can be located in Table 25.

Table 24. ANOVA

Model.	SS	df.	Mean-Square	F	Significant
Regression	288.300	1	288.300	1109.752	.000
Residual	97.680	376	.260		
Total	385.980	377			

Table 25. Coefficients

Model	Unstandardized Coefficients.		Standardized Coefficients.	t.	Significant
	B	Std. Error	Beta		
(Constant)	.341	.112		3.052	.002
Training effectiveness	.947	.028	.864	33.313	.000

4. Conclusion

Here are the conclusions that can be drawn from this study. It has been established that information system has a significant and positive impact on organizational performance. The study employed a robust methodology to generate results that contribute to the field of IS evaluation by identifying several factors influencing IS success. The research framework was rigorously tested, providing evidence of a significantly positive association between information system effectiveness and both financial and non-financial indicators of organizational performance. The analysis yielded the finding that management information systems contribute to improving performance. Moreover, MIS plays a role in shaping decision-making within service organizations, facilitating prompt and strategic decisions to gain a competitive edge in the market. Based on the study's findings, the following recommendation for improvement were provided: It is well-established in this research that continuous exposure to contemporary knowledge, skills, and technology will enhance organizational performance.

Reference

- [1]. DeLone WH, McLean ER. Information systems success: The quest for the dependent variable. *Information systems research*. 1992;3(1):60-95.
- [2]. Hooper P, Page J. Organizing information & data flows in business systems. *National Public Accountant*. 1997;42(9):9-1
- [3]. Fisher B, Kenny R. Introducing a business information system into an engineering company. *Information Knowledge Systems Management*. 2000;2(2):207-21.
- [4]. Davis GB, Olson MH. *Management information systems: Conceptual foundations, structure, and development*: McGraw-Hill, Inc.; 1984.
- [5]. Aygerou C. Information systems: what sort of science is it? *Omega*. 2000;28(5):567-79.
- [6]. Triplett JE, Bosworth BP, editors. *Productivity in the services sector*. presentation at the American Economic Association meetings, January; 2000.
- [7]. Swierczek FW, Shrestha PK. Information technology and productivity: a comparison of Japanese and Asia-Pacific banks. *The Journal of High Technology Management Research*. 2003;14(2):269-88.
- [8]. Symons VJ. Impacts of information systems: four perspectives. *Information and Software Technology*. 1991;33(3):181-90.
- [9]. Van der Heijden H. User acceptance of hedonic information systems. *MIS quarterly*. 2004:695-704.
- [10]. Baskerville RL, Myers MD. Information systems as a reference discipline. *MIS quarterly*. 2002:1-14.
- [11]. Hamilton S, Chervany NL. Evaluating information system effectiveness-Part I: Comparing evaluation approaches. *MIS quarterly*. 1981:55-69.
- [12]. Kirby J. Toward a theory of high performance. *Harvard business review*. 2005;83(7):30-9, 190.
- [13]. Yamin S, Gunasekaran A, Mavondo FT. Relationship between generic strategies, competitive advantage and organizational performance: an empirical analysis. *Technovation*. 1999;19(8):507-18.
- [14]. Chakravarthy BS. Measuring strategic performance. *Strategic management journal*. 1986;7(5):437-58.
- [15]. Young-Harry DL, Oparanma AO, Ejo-Orusa HA. Management information system and organizational performance of Seven-Up Bottling Company in Aba and Port Harcourt. *International Journal of Economics and Business Management*. 2018;4(4):53-61.
- [16]. Abdulhabib AAA, Al-Dhaafri HS. The moderating role of training on the relationship between strategy management, information technology management and organisational performance of Sharjah Police. *PEOPLE: International Journal of Social Sciences*. 2019;5(1):866-86.
- [17]. Sinulingga M, Djati P, Thamrin S, Saragi HJR, Riyadi BS, Ubayanto T. Antecedents and Consequences of Smart Management Information System for Supervision to Improve Organizational Performance. *International Journal of Membrane Science and Technology*. 2023;10(2):816-24.
- [18]. Bharati P, Chaudhary A. Product customization on the web: an empirical study of factors impacting choiceboard user satisfaction. *Information Resources Management Journal (IRMJ)*. 2006;19(2):69-81.
- [19]. Po-An Hsieh JJ, Wang W. Explaining employees' extended use of complex information systems. Taylor & Francis; 2007. p. 216-27.
- [20]. Klein R. An empirical examination of patient-physician portal acceptance. *European Journal of Information Systems*. 2007;16:751-60.
- [21]. Bradley RV, Pridmore JL, Byrd TA. Information systems success in the context of different corporate cultural types: an empirical investigation. *Journal of Management Information Systems*. 2006;23(2):267-94.
- [22]. Wixom BH, Todd PA. A theoretical integration of user satisfaction and technology acceptance. *Information systems research*. 2005;16(1):85-102.
- [23]. Gorla N, Somers TM, Wong B. Organizational impact of system quality, information quality, and service quality. *The Journal of Strategic Information Systems*. 2010;19(3):207-28.
- [24]. Chang JC-J, King WR. Measuring the performance of information systems: A functional scorecard. *Journal of Management Information Systems*. 2005;22(1):85-115.
- [25]. Kahn BK, Strong DM, Wang RY. Information quality benchmarks: product and service performance. *Communications of the ACM*. 2002;45(4):184-92.
- [26]. Pitt LF, Watson RT, Kavan CB. Service quality: a measure of information systems effectiveness. *MIS quarterly*. 1995:173-87.

- [27]. DeLone WH, McLean ER. The DeLone and McLean model of information systems success: a ten-year update. *Journal of management information systems*. 2003;19(4):9-30.
- [28]. Thong JYL, Yap C-S. Information systems effectiveness: A user satisfaction approach. *Information Processing & Management*. 1996;32(5):601-10.
- [29]. Gefen D. It Is Not Enough to Be Responsive: The Role Of. *Database*. 2000;31(2):65.
- [30]. Amoako-Gyampah K. Perceived usefulness, user involvement and behavioral intention: an empirical study of ERP implementation. *Computers in human behavior*. 2007;23(3):1232-48.
- [31]. Amoako-Gyampah K, Salam AF. An extension of the technology acceptance model in an ERP implementation environment. *Information & management*. 2004;41(6):731-45.
- [32]. Hair JF, Black, W.C., Babin, B.J. and Anderson, R.E. . *Multivariate Data Analysis*. 7th Edition ed. New York: Pearson; 2010.
- [33]. Tabachnick BG, & Fidell, L. S. *Using Multivariate Statistics*. 5th, editor. New York: Allyn and Bacon; 2007.