



THE IMPACT OF ERP SYSTEMS ON THE PERFORMANCE OF MOROCCAN COMPANIES: AN ASSESSMENT OF THE STRUCTURAL MODEL

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Received 08.05.2025.
Revised 28.07.2025.
Accepted 07.08.2025.

Keywords:

ERP, Economic Performance, Organizational Performance, Human Performance, Moroccan Companies

ABSTRACT

Enterprise Resource Planning (ERP) systems represent a major opportunity to enhance business efficiency. This study seeks to assess the impact of ERP implementation on the performance of Moroccan companies, focusing on three key dimensions: economic, organizational, and human performance.

Data were collected through a questionnaire distributed to executives of Moroccan companies and analyzed using SmartPLS4 software.

The findings confirm that ERP adoption has significantly improved the economic, organizational, and human performance of Moroccan businesses.

Notably, the implementation of a unified database has greatly enhanced the reliability of information exchange. This improvement has, in turn, strengthened communication and coordination across the various departments within the company.



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1. INTRODUCTION

Over recent decades, the widespread adoption of Enterprise Resource Planning (ERP) systems has emerged as a cornerstone of digital transformation for businesses globally. These systems, which unify diverse operational processes within a single technological platform, have enabled organizations to streamline operations and enhance their competitive edge.

In Morocco, where the economy has demonstrated consistent growth and greater integration into global markets, ERP adoption has garnered significant interest. Its potential to boost competitiveness and operational efficiency makes it particularly relevant in a dynamic and ever-changing economic environment.

Research highlights the crucial role of ERP systems as an integrated technological framework, enabling companies to consolidate their operations and processes.

This consolidation leads to a significant improvement in their operational agility and ability to quickly adapt to market fluctuations. Indeed, the integrated nature of ERP systems allows for better management of workflows and resource optimization, thereby enhancing companies' ability to meet changing customer demands and capitalize on emerging market opportunities.

Similarly, the research on economic development emphasizes the importance of adopting ERP systems in developing countries, highlighting the potential benefits of these systems for modernizing business practices and

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improving productivity. These advantages are particularly relevant in the Moroccan context, where the ongoing pursuit of innovation and operational efficiency is crucial for supporting economic growth and strengthening the country's competitive position on the international stage.

Thus, the integration of ERP systems in Morocco is seen as a key strategy to enhance the competitiveness and efficiency of businesses in an ever-evolving economic landscape, providing an essential tool to meet the changing demands of the global market and stimulate long-term economic growth.

This study seeks to evaluate the impact of ERP systems on the performance of Moroccan companies, focusing on three dimensions: economic, organizational, and human. By employing quantitative research methodologies, it aims to provide a comprehensive analysis of how ERP adoption influences key performance metrics.

The conceptual model underpinning this study is presented in Figure 1. Based on the diagram of the proposed conceptual model, we will establish a general hypothesis: "GH: The Contributions of ERP impact business performance" and six sub-hypotheses:

- H1: The economic contributions of ERP impact economic performance.
- H2: The organizational contributions of ERP impact organizational performance.
- H3: The human contributions of ERP impact human performance.
- H4.1: The economic contributions of ERP impact overall performance.

- H4.2: The organizational contributions of ERP impact overall performance.
- H4.3: The human contributions of ERP impact overall performance.

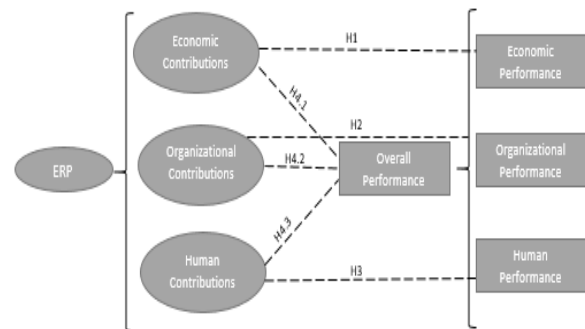


Figure 1. Proposed Conceptual Model for Analyzing the Impact of ERP on Business Performance

2. MATERIALS AND METHODS

To achieve our objective, we have chosen the structural equation modeling (SEM) method using SmartPLS4 software. This choice is justified for three reasons: First, this method allows for the analysis of latent variables. Second, it ensures the reliability and validity of the measurement model. Third, it enables the examination of direct, indirect, and total effects between multiple variables.

In this regard, we will test all the relationships that explain the phenomenon under study, as presented in our conceptual model. To do so, we will adhere to the following conditions (Table 1).

Table 1. Instruments for Evaluating the Structural Model and Testing the Hypotheses

Indicators	Measurement Instruments
Path coefficient	<ul style="list-style-type: none"> - If P-value is between 0.01 and 0.05 = significant relationship* - If P-value is below 0.01 = strong significant relationship** - If P-value is above 0.05 = the hypothesis is rejected
R ² Determination Coefficient	Helps understand the contribution of each explanatory variable to the prediction of the dependent variable. According to Falk and Miller (1992), if the value of R ² is greater than 0.10, the model is significant.
Effect Size f ²	Indicates the relative effect of a specific exogenous latent variable on one or more endogenous latent variables through changes in R ² (Chin, 1998). According to Cohen (1988): <ul style="list-style-type: none"> - f² > 0.35: Large effect size; - f² between 0.15 and 0.35: Medium effect size; - f² between 0.02 and 0.15: Small effect size; - f² < 0.02: No effect size.
Goodness of Fit of the Model (GoF)	To determine the overall quality of the model. According to Wetzels et al. (2009): <ul style="list-style-type: none"> - GoF less than 0.1 = Poor fit - GoF between 0.1 and 0.25 = Small - GoF between 0.25 and 0.36 = Medium - GoF greater than 0.36 = Good fit

3. EVALUATION OF THE STRUCTURAL MODEL

In PLS, the evaluation of a structural model can be carried out through several measures, including the coefficient of determination (R²), hypothesis testing (path

coefficients), effect size f², predictive relevance Q², and the goodness of fit of the model (GoF).

3.1 Path-coefficient

To test our hypotheses, we opt for the bootstrapping procedure, in which a large number of subsamples (for

example, 5000) are drawn from the original sample with replacement to obtain bootstrap standard errors, which in turn provide approximate t-values and p-values for structural path significance tests (Hair, 2012).

Furthermore, we will use the p-value indicator, which measures the probability of error. This means that we can accept the relationship if it works 95% of the time (Table 2).

Table 2. Path-coefficient

Original sample	Sample Mean	STDV	T-statistics	P-value	Decision
H1: Impact of ERP Economic Contributions on Economic Performance	0.319	0.359	0.136	2.346	0.019
H2: Impact of ERP Organizational Contributions on Organizational Performance	0.547	0.548	0.097	5.645	0.000
H3: Impact of ERP Human Contributions on Human Performance	0.355	0.359	0.110	3.229	0.001
H4.1: Impact of ERP Economic Contributions on Overall Performance	-0.003	-0.005	0.005	0.604	0.546
H4.2: Impact of ERP Organizational Contributions on Overall Performance	0.000	0.001	0.003	0.116	0.908
H4.3: Impact of ERP Human Contributions on Overall Performance	0.001	0.001	0.003	0.368	0.713

The hypothesis testing allowed for the rejection of three hypotheses where the p-values exceed 0.05, namely: the relationship between economic contributions and overall performance (p-value = 0.908), the relationship between organizational contributions and overall performance (p-value = 0.546), and the relationship between human contributions and overall performance (p-value = 0.713).

On the other hand, the other hypotheses proved to be highly significant with p-values below 0.01, except for the relationship between economic contributions and economic performance, which has a p-value below 0.05.

3.2 Coefficient of Determination R²

The coefficient of determination (R²) for each endogenous latent variable measures the relationship between the explained variance of a latent variable and its total variance (Hair et al., 2011). As presented in Table 3, the R² values reflect the model’s explanatory power. According to Falk and Miller (1992), an R² value greater than 0.10 indicates that the model is significant. Based on this criterion, all latent variables in the model are considered significant, as their R² values exceed the 0.10 threshold.

Table 3. Coefficient of Determination R²

	C1	C2
Economic Performance	0.101	Significant
Organizational Performance	0.300	Significant
Human Performance	0.126	Significant
Overall Performance	1.000	Significant

3.3 Effect Size f²

The effect size f² is used to assess the impact of each exogenous latent variable on the endogenous latent variable(s) in relation to the change in R² (Chin, 1998). According to Cohen (1988), values of 0.02, 0.15, and 0.35 correspond to small, medium, and large effect sizes, respectively, while a value below 0.02 indicates the absence of an effect size.

As shown in Table 4, the explanatory variable "Economic Contributions" has minimal effects on the dependent variables "Economic Performance" and "Overall Performance," with values of 0.113 and 0.078, respectively. Similarly, "Human Contributions" exerts only a limited effect on "Human Performance" and "Overall Performance." In contrast, "Organizational Contributions" makes a significant contribution to "Organizational Performance." However, it does not have a significant effect on the dependent variable "Overall Performance."

Table 4. Effect Size f²

	Economic Performance	Organizational Performance	Human Performance	Overall Performance
Economic Contributions	0.113			0.078
Organizational Contributions		0.428		0.001
Human Contributions			0.144	0.012

3.4 Effect Size f²

In the PLS approach, there is no global index for model validation. To address this gap, Tenenhaus et al. (2005) developed the GoF adjustment index, which integrates

both the measurement model and the structural model. Its calculation formula is the geometric mean of the average extracted eigenvalues (AVE) and the average R² coefficients:

$$GoF = \sqrt{(R^2 \times AVE)}$$

According to the results obtained, we observe a score of approximately 0.366. According to the criteria established by Wetzels et al. (2009), this value of 0.36 is considered significantly high, indicating a robust overall performance of the model.

4. ANALYSIS OF THE MEDIATING EFFECT

Many phenomena cannot be understood in a linear manner through the direct relationship between explanatory variables and the dependent variables, thus requiring the introduction of intermediate variables. Similarly, the mediating variable, according to Baron and Kenney (1986), is the variable (Z) that can explain the

relationship between an independent variable (X) and a dependent variable (Y).

According to Preacher and Hayes (2008), the analysis of the mediating effect occurs in two stages: Bootstrapping the indirect effect (Total effect) and the confidence interval test.

4.1 Bootstrapping the Indirect Effect

The relationship between the independent variable and the dependent variable through a mediator must be significant.

According to Table 5 of sums of indirect effects, the first condition regarding the existence of an indirect effect between the independent and dependent variables has been confirmed.

Table 5. Sum of Indirect Effects

	Original sample	Sample Mean	STDEV	T-statistics	P-value	Decision
H4.1	0.118	0.133	0.051	2.311	0.021	Accepted
H4.2	0.246	0.244	0.041	5.985	0.000	Accepted
H4.3	0.105	0.105	0.032	3.319	0.021	Accepted

4.2 Bootstrapped Confidence Interval

The rule for this second condition states that the lower and upper bounds of the confidence interval (CI) must not be separated by the value 0, as shown in Figure 2.

The bootstrapped confidence interval table (Table 6) for the total effect presents results that confirm the second condition for all three relationships, as the lower and upper limit (LL and UL) values do not cross zero.



Figure 2. Example of a Bootstrapped Confidence Interval

According to the two conditions of Preacher and Hayes (2008), we observe that the mediating effect is confirmed for all three relationships in our model.

Table 6. Bootstrapped Confidence Interval

	Direct effects	CI	t	P-Value	Indirect effects	CI	t	P-Value	Decision
H4.1	-0.003	[-0.016-0.001]	0.604	0.546	0.118	[0.055-0.212]	2.311	0.021	Confirmed
H4.2	0.000	[-0.004-0.009]	0.116	0.908	0.246	[0.161-0.320]	3.319	0.000	Confirmed
H4.3	0.001	[-0.005-0.007]	0.368	0.713	0.105	[0.042-0.163]	5.985	0.001	Confirmed

5. DISCUSSION

The aim of our research was to illustrate the impact of ERP integration on the performance of Moroccan companies, focusing on the evaluation criteria of the different aspects of performance. After reviewing the relevant literature on the subject (Barha & Ait Lemqeddem, 2023), we identified three explanatory variables to be included in our study: the Economic Contributions of ERP, the Organizational Contributions of ERP, and the Human Contributions of ERP. Thus, our study also led us to identify three performance variables to explain: economic performance, organizational performance, and human performance.

5.1 Link between the Economic Contributions of ERP and Performance

The use of an ERP system can positively impact company performance by enabling better management of data and business processes. The literature highlights a positive relationship between economic contributions and a company's economic performance (Hitt et al., 2002; Hunton et al., 2003; Nicolaou, 2004; Matolcsy et al., 2005; Nicolaou & Bhattacharya, 2006; Dehning et al., 2007). The results of our study confirm the direct relationship between the economic contributions of ERP and the company's economic performance, with a positive and significant coefficient of 0.319 at the 5% threshold. Therefore, we can confirm the hypothesis that

implementing ERP in Moroccan companies improves their economic performance.

Our study reveals that ERP integration leads to savings in time, material, and human resources, as well as cost reductions. In line with Shang and Seddon (2002), ERP implementation can contribute to cost reduction, a decrease in operational cycle time, and improvements in productivity and quality. According to our analyses, ERP integration also improves the quality of services or products, leading to customer satisfaction.

However, while ERP integration can generate competitive advantages such as increased revenue and market share, this was not the case for Moroccan companies. Additionally, the implementation of ERP in Moroccan companies had no significant impact on either the company's revenue growth or market share.

Thus, based on our results, the economic contributions of ERP have a small effect on the overall performance of the company ($f^2 = 0.078$), although its effect on economic performance is moderate ($f^2 = 0.113$).

5.2 Link between the Organizational Contributions of ERP and Performance

The use of an ERP system can also positively impact organizational performance by facilitating better coordination and communication between departments, improving decision-making through enhanced data visibility. Our model results highlight a positive and significant relationship (at the 5% level) between ERP implementation and organizational performance, with a coefficient of 0.547. This result is consistent with previous empirical literature, such as Kalika (1988) and Chaabouni (1992), who showed that ERP implementation has a direct impact on organizational performance.

ERP integration can reduce the time required to obtain necessary information and make management decisions while simultaneously reducing costs. It also improves communication with suppliers and customers and can promote the adoption of standardized business processes across the organization (Al-Mashari et al., 2003). Based on our study's results, we can confirm that ERP integration in Moroccan companies enhances their organizational performance.

However, in our study, the direct relationship between the organizational contributions of ERP and the company's overall performance was not significant, as the p-value (0.908) is greater than 5%. Nevertheless, the relationship between the organizational contributions of ERP and the company's overall performance through a mediator is highly significant (p-value = 0.000). Therefore, there is an indirect effect between these two variables.

5.3 Link between the Human Contributions of ERP and Performance

ERP integration is a true organizational innovation, with the human element at its core. The ability of individuals to integrate the new tool and rethink the organization through its processes is a crucial factor (Lochet, 2015). Management literature often emphasizes the importance of individual satisfaction within an organization as a determinant of increased productivity and the acceptance of ICTs by users (Delone & McLean, 1992).

Additionally, ERP helps managers with decision-making and planning, enabling them to better manage resources and improve the performance of various operational decisions (Shang & Seddon, 2002). It also contributes to improving employees' knowledge and productivity (Fourati, 2006).

In our study, the result for the relationship between the human contributions of ERP and human performance in Moroccan companies is significant, with a p-value of 0.001 and an explanatory power of $\beta = 0.355$. Thus, we can confirm the hypothesis that ERP implementation in Moroccan companies enhances their human performance.

While the human contributions of ERP have a significant impact on the company's human performance, the direct link between human contributions and the company's overall performance was not confirmed in our study, as the p-value was greater than 5%. However, the relationship between the human contributions of ERP and the company's overall performance through a mediator is significant (p-value = 0.021). Therefore, there is an indirect effect between these two variables.

6. CONCLUSION

In conclusion, our research has confirmed the differentiated impact of ERP contributions on various aspects of Moroccan companies' performance. While ERP integration showed a direct and significant effect on economic, organizational, and human performance, these effects vary in intensity and are sometimes indirect when it comes to overall performance. The results demonstrate that while ERP contributes positively to specific performance aspects, its influence on overall performance requires the consideration of mediating factors. These findings highlight the importance of adopting tailored implementation strategies to maximize the positive impacts of ERP on competitiveness and business management in the Moroccan context.

Acknowledgment: I would like to express my gratitude to all the authors whose contributions have made this work possible.

References:

- Al-Mashari, M., Al-Mudimigh, A., & Zairi, M. (2003). Enterprise Resource Planning: A Taxonomy of Critical Factors, *European Journal of Operational Research*, 146, 352-364.
- Barha, M., & Ait Lemqeddem, H. (2023). Bibliometric Analysis of ERP and Performance: Current situation, *SHS Web of Conferences*, 175. doi: 10.1051/shsconf/202317501039.
- Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51(6), 1173–1182. Doi: 10.1037/0022-3514.51.6.1173.
- Chaabouni, J. (1992). Le concept de performance dans les théories du management, *Actes de Colloque, FSEG Sfax*.
- Chin, W. W. (1998). The partial least squares approach to structural equation modeling, *Modern methods for business research*, 295(2), 295-336.
- Cohen, J. (1988). Set correlation and contingency tables. *Applied psychological measurement*, 12, 425-434.
- Dehning, B., Richardson, V. J., & Zmud, R. W. (2007). The Financial Performance Effects of IT-Based Supply Chain Management Systems in Manufacturing Firms. *Journal of Operations Management*, 25, 806-824.
- Delone, W. H., & McLean, E. R. (1992), Information systems success: the quest for the dependent variable. *Information Systems Research*, 3, 60–95.
- Falk, R. F., & Miller, N. B. (1992). *A primer for soft modeling*, Akron, OH: University of Akron Press.
- Fourati, F. (2006). Veille stratégique : L'évaluation de l'utilisation des agents intelligents, *Thèse Doctorat sciences de gestion, Université Paris Dauphine, CREPA*.
- Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: indeed a silver bullet, *The journal of Marketing theory and Practice*, Vol. 19, 139-151.
- Hair, J. F., Sarstedt, M., Ringle, C. M., & Mena, J. A. (2012). An assessment of the use of partial least squares structural equation modeling in marketing research. *Journal of the academy of marketing science*, 40, 414-433.
- Hitt, L. M., Wu, D. J., & Zhou, X. (2002). Investment in enterprise resource planning: Business impact and productivity measures, *Journal of Management Information Systems*, 19, 71-98.
- Hunton, J. E., Lippincott, B., & Reck, J. (2003). Enterprise Resource Planning Systems: Comparing Firm Performance of Adopters and Nonadopters. *International Journal of Accounting Information Systems*, 4, 165-184.
- Kalika, M. (1988). *Structure de l'entreprise, réalité, déterminants et performance*. Economica, Paris.
- Lochet, F. (2015). Implantation d'un ERP analyse des impacts technico-organisationnels sur la performance des entreprises industrielles. *Cahiers du LAB.RII*, 290.
- Matolcsy, Z., Booth, P., & Wieder, B. (2005). Economic benefits of enterprise resourceplanning systems: some empirical evidence, *Accounting and Finance*, 45(3), 439-456.
- Nicolaou, A. I., & Bhattacharya, S. (2006). Organizational performance effects of ERP systems usage: The impact of post-implementation changes, *International Journal of Accounting Information Systems*, 7(1), 18-35.
- Nicolaou, A. I. (2004). Reply to discussion of: Firm performance effects in relation to the implementation and use of enterprise resource planning systems. *Journal of Information Systems*, 19(2), 111-112.
- Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior research methods*, 40, 879-891.
- Shang, S. S. C., & Seddon, P. B. (2002). Assessing and managing the benefits of enterprise systems: the business manager's perspective, *Journal of Information Systems*, Vol. 12, 271-299.
- Wetzels, M., Odekerken-Schröder, G., & Oppen, C. V. (2009). Using PLS Path Modeling for Assessing Hierarchical Construct Models: Guidelines and Empirical Illustration. *MIS Quarterly*, 33(1), 177-195.

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