ERP Implementation Success Factors Across Project Phases: An Action Research and Fuzzy AHP Study in Moroccan SMEs

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***Abstract*—Today, adopting an ERP has become a critical decision for Small and Medium-sized Enterprises (SMEs) seeking to modernize their information systems and implement integrated management. In this context, it is crucial to identify the Critical Success Factors (CSFs) to ensure the successful ERP Implementation (ERPI). However, previous studies have generally analyzed these factors in a broad sense, without considering their progression through the various phases of the ERPI process. The objective of this study is to identify the CSFs associated with each phase of the ERPI process, as well as to determine their relative importance in each of these phases within Moroccan SMEs. To achieve this objective, a mixed-methods approach was adopted. The action research method was used to identify the CSFs associated with each phase of the ERPI process within Moroccan SMEs. Additionally, we used the Fuzzy AHP method to determine their relative importance in each of these phases. The results indicate that the importance of CSFs varies across the different phases of ERPI. During the analysis phase, strategic factors are paramount, while those related to project management and technology gain in importance during the design and implementation phases. Finally, organizational factors play a crucial role during the final preparation phase, as well as during the implementation and support phase. This research complements the existing literature, which analyzes key success factors in a general way, by offering a phase-by-phase analysis of the ERPI process. It provides ERP consultants and project managers with a clear overview of the factors to prioritize at each phase of the project, and helps reduce the risk of ERP failure by identifying the key success factors that ensure the successful implementation of ERP within Moroccan SMEs.**

***Keywords*—ERP; ERP Implementation; CSFs; Moroccan SMEs; Integrated IS**

I. Introduction

Nowadays, most organizations capitalize on the adoption of reliable and efficient solutions to archive and manage the large amount of information produced during daily transactions, to achieve better management and decision-making.

ERP is a software designed for the management and organization of all administrative processes of an organization in different departments that have a codified database that allows simplified analysis and rapid sharing in real-time [1]. Various companies have made the decision to implement ERP as a new system to reduce operating costs, improve productivity, and enhance services to the customer [2].

Successful ERPI offers many advantages such as better service to customers, good quality production, and reduced cost, but the implementation of ERPs is always a great challenge for several organizations [3, 4, 5].

To improve the chances of success for ERPPs, several studies have focused on identifying the CSFs that influence the success of these projects [6,7]. Taking these factors into account enables organizations to better manage the risks associated with ERPIs and increase the likelihood of project success [6].

This issue is particularly important for SMEs, which generally have more limited financial, human, and technical resources than large companies. In this context, identifying and managing CSFs is essential to ensuring the effective implementation of ERP.

However, although numerous studies have identified the CSFs for ERPPs, there is a lack of research that identifies these factors and their importance across the various phases of ERPI, particularly in the context of Moroccan SMEs.

In this context, this study aims to identify the CSFs and determine their relative importance in each phase of ERPI within Moroccan SMEs.

II. Literature Review

A. ERPI Process

The implementation of an information system is generally viewed as a process consisting of several successive phases [8,9]. An ERP Project (ERPP) is a comprehensive development process within a company that includes several phases of planning and execution.

According to [10], the implementation of an ERP involves three essential phases, namely: Pre-implementation, Implementation, and Post-implementation.

However, other researchers subdivide these phases into several sub-phases in order to better understand the specific characteristics of the activities carried out during the project.

Table I provides an overview of the process for implementing an ERP.

TABLE I. ERP IMPLEMENTATION PROCESS

Authors	Pre-Implementation	Implementation	Post-Implementation
[11]	Adoption Acquisition	Implementation	Use & Maintenance Evolution Retirement
[12]	Design	Implementation	Stabilization Improvement Transformation
[13]	Chartering	Project	Shakedown Onward & Upward
[14]	Planning	Project	Enhancement
[15]	Planning	Implementation	Stabilization Improvement
[16]	Initiation Adoption	Adaptation	Acceptance Routinization Infusion
[17]	Planning	Transition Performance	Enhancement

B. CSFs for ERPI

Various research studies have been conducted to identify the CSFs in ERPI. In our research, a detailed analysis of the literature on the CSFs associated with ERPI was conducted. To this end, we conducted a systematic review using a rigorous methodology. This approach was based on a review of published studies specifically focusing on CSFs in recognized scientific journals. The analysis followed the standard steps of a systematic review: planning, article selection, content analysis, and synthesis of results.

In total, this analysis identified 33 factors influencing the success of ERPPs. To facilitate their analysis, these factors were grouped into four main categories: Strategic factors, Organizational factors, Project management factors, and Technological factors.

Table I provides an overview of the CSFs identified in our study, along with their classification.

TABLE II. OVERVIEW OF THE IDENTIFIED CSFS

Category	Factor	Author
Strategic	Top management support	[7,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35]
	Clear goals and objectives	[20,22,23,26,28,32,35,45,47]
	ERPI Strategy	[7,28,31,32,36]
	Project champion	[7,20,22,25,26]
	Commitment of people to the implementation	[7,22,39]
Organizational	Organizational culture	[7,36,34,37,38]
	Organizational change management	[20,23,26,40,42]
	End-user and stakeholder involvement	[20,29,30,36,38,46]
	Training to users	[20,21,22,23,24,32,35,39,41,43,44,45]
	Efective communication	[22,26]
	Interdepartmental cooperation	[22,26]
	Human resource planning	[36,39]
	Supplier relationship and support	[7,20,21,22,26,43]
	Use and consultant support	[23,25,26,28,32,34,43,44]
	Process Reengineering	[20,22,25]
Project management	Excellent project management	[7,20,21,22,25,26,32,40,41]
	Steering committee	[26,36]
	Project Budget	[33,34,47]
	Project duration	[30,33,34,35,41,44,45,47]
	Implementation Methodology	[7,42]
	Implementation team	[36,48,49]
	Project team competence	[22,26,48,49]
	Teamwork	[7,20,21,22,27,28,32,33,35,44,45,46,48]
Technological	Minimal customization	[20,22,26,42]
	ERP price level	[36,43]
	Technological infrastructure	[20,22,28,34,39,45]
	Architecture choices	[22,26]
	ERP software selection	[7,23,33,34,44,45,48,50,51]
	ERP tests	[7,23,50,51]
	System reliability	[7,48,50]
	System scalability	[7,48,50]
	Data analysis and migration	[32,33,35,38]
	ERP configuration	[30,33,34,35]

However, most existing studies analyze CSFs in a general way, without taking into account how they evolve across the different phases of ERPI.

To address this limitation, this research aims to identify the CSFs specific to each phase of the ERPI process within Moroccan SMEs and to determine the relative importance of these factors during the different phases of the project.

III. RESEARCH QUESTIONS

Given this gap in the literature, this study aims to answer the following question: How do CSFs vary across the different phases of the ERPI process in Moroccan SMEs, and what is their relative importance at each phase of the project?

We will attempt to answer this central question through the following sub-questions:

1) What are the CSFs associated with each phase of the ERPI process within Moroccan SMEs?

2) What is the relative importance of these factors in each phase of ERPI within Moroccan SMEs?

IV. RESEARCH METHODOLOGY

To answer these research questions, we adopted a mixed research method.

A. Action research

To answer the first research question, we used the action research method.

We chose this method because we could not find any work on this subject in Morocco using the action research method.

Furthermore, this method places the researcher within the company, allowing for close observation.

The action research method is a type of case study in which the author, usually the researcher, actively participates in the implementation of the system [52]. It aims to solve problems while generating knowledge [53].

The action research cycle follows a cyclical process comprising a preliminary stage aimed at defining the context and objective, as well as four main stages: constructing, planning action, taking action, and evaluating action. Fig. 1 presents the action research cycle.

Constructing: Based on the context and the defined objective, the action researcher develops hypotheses drawing on the state of the art and their expertise in the field.

Planning action: The action researcher plans all stages of the project based on the established hypotheses and in collaboration with the project team.

Taking action: The action researcher implements the planned actions with the participation of all project stakeholders.

Evaluating action: The action researcher carries out the necessary checks to evaluate the achievement of results in relation to the hypotheses formulated.

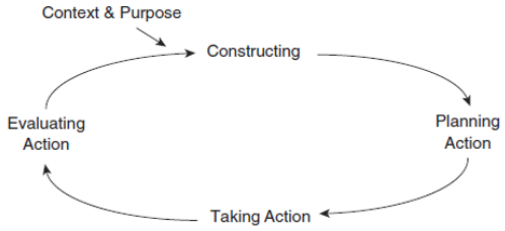

Fig. 1. Action research cycle

In our study, the action research method was used in 2 Moroccan SMEs. I had the opportunity to work on both projects as project manager. In this capacity, I was responsible for directing and supervising the implementation of the respective projects. As project manager, my role included strategic planning, team coordination, and supervision of the various phases of project implementation. This experience as a manager directly involved in these initiatives and gave me an in-depth perspective on the challenges and successes encountered during these complex ERPI processes. Table III presents the cases studied.

TABLE III. DESCRIPTION OF THE CASE STUDIES

	Company A	Company B
Year	2014	2013
Specialty	Coaching, leadership and management	Consulting, audit and support
ERP	Odoo Version 11	Odoo Version 12
Modules	Purchasing, Sales, CRM, Inventory, Billing, Accounting, Document, Project, Human Resources	Purchasing, Sales, CRM, Inventory, Billing, Accounting, Document, Project, Human Resources, Signature

B. Fuzzy Analytic Hierarchy Process

To answer the second question, we adopted a multi-criteria approach using the Fuzzy AHP.

The AHP is a multi-criteria decision-making method that allows a complex problem to be structured by ranking criteria and quantifying their relative importance based on expert judgments [54]. However, expert judgments can be subject to uncertainty and imprecision. To overcome this limitation, the Fuzzy AHP approach was developed by integrating fuzzy set theory into the AHP method [55].

For this study, data were collected from consultants who had participated in ERPI projects at Moroccan SMEs. These consultants were asked to conduct pairwise comparisons between the various CSFs identified for each phase.

The method applied consists of five main steps: constructing the fuzzy comparison matrix, calculating fuzzy sums, determining synthetic values, defuzzifying weights, and final normalization.

1) Construction of the fuzzy comparison matrix

a) Define the CSFs

Note the CSFs for the phase:

$$CSF_1, CSF_2, \ldots, CSF_N$$

(e.g., CSF_1 = Support and involvement of senior management, CSF_2 = Involvement of end users and stakeholders, …)

b) Pairwise comparison (question for consultants): The CSFs are compared in pairs by consultants to assess their relative importance in the phase.

For each pair CSF_i, CSF_j, the following question is asked:

In this phase, is CSF_i more important than CSF_j? And to what extent?

c) Conversion to a triangular fuzzy number (TFN)

Each response is converted to a triangular fuzzy number:

$$\tilde{a}_{\{ij\}} = \left(l_{\{ij\}}, m_{\{ij\}}, u_{\{ij\}}\right)$$

Interpretation:

- l = lowest possible value
- m = most likely value
- u = highest possible value

Linguistic judgments are converted into fuzzy numbers according to the scale shown in the following Table IV.

d) Aggregation (average) when there are multiple consultants.

When multiple consultants participate in the evaluation, and each provides (l_k, m_k, u_k), then the final cell is:

$$l_{\{ij\}} = \frac{1}{K}\sum_{k=1}^{k} l_{i,j}^{(K)}$$

$$m_{\{ij\}} = \frac{1}{K}\sum_{k=1}^{k} m_{i,j}^{(K)}$$

$$u_{\{ij\}} = \frac{1}{K}\sum_{k=1}^{k} u_{i,j}^{(K)}$$

TABLE IV. CONVERTING LINGUISTIC JUDGMENTS INTO TRIANGULAR FUZZY NUMBERS.

Linguistic variables	Fuzzy scale	Corresponding fuzzy scale
Equally important	(1, 1, 1)	(1, 1, 1)
Moderately important	(1/2, 1, 3/2)	(2/3, 1, 2)
Important	(3/2, 2, 5/2)	(2/5, 1/2, 2/3)
Very important	(5/2, 3, 7/2)	(2/7, 1/3, 2/5)
Extremely important	(7/2, 4, 9/2)	(2/9, 1/4, 2/7)

where, K represents the number of consultants.

Therefore:

$$\tilde{a}_{\{ij\}} = \left(\frac{1}{K}\sum_{k=1}^{k} l_{i,j}^{(K)}, \frac{1}{K}\sum_{k=1}^{k} m_{i,j}^{(K)}, \frac{1}{K}\sum_{k=1}^{k} u_{i,j}^{(K)}\right)$$

e) Consistency rules for the matrix

Diagonal:

A criterion compared to itself is equal to:

$$\tilde{a}_{\{ii\}} = (1,1,1)$$

Reciprocal (inverse):

If:

$$\tilde{a}_{\{ij\}} = (l, m, u)$$

So:

$$\tilde{a}_{\{ji\}} = \tilde{a}_{\{ij\}}^{\{-1\}} = \left(\frac{1}{u}, \frac{1}{m}, \frac{1}{l}\right)$$

f) Result of this step: We obtain the fuzzy comparison matrix:

$$\tilde{A} = \begin{bmatrix} 1,1,1 & \tilde{a}_{\{12\}} & \tilde{a}_{\{13\}} & \tilde{a}_{\{14\}} & \tilde{a}_{\{15\}} & \tilde{a}_{\{16\}} \\ \tilde{a}_{\{21\}} & 1,1,1 & \tilde{a}_{\{23\}} & \tilde{a}_{\{24\}} & \tilde{a}_{\{25\}} & \tilde{a}_{\{25\}} \\ \tilde{a}_{\{31\}} & \tilde{a}_{\{32\}} & 1,1,1 & \tilde{a}_{\{34\}} & \tilde{a}_{\{35\}} & \tilde{a}_{\{36\}} \\ \tilde{a}_{\{41\}} & \tilde{a}_{\{42\}} & \tilde{a}_{\{43\}} & 1,1,1 & \tilde{a}_{\{45\}} & \tilde{a}_{\{46\}} \\ \tilde{a}_{\{51\}} & \tilde{a}_{\{52\}} & \tilde{a}_{\{53\}} & \tilde{a}_{\{54\}} & 1,1,1 & \tilde{a}_{\{56\}} \\ \tilde{a}_{\{61\}} & \tilde{a}_{\{62\}} & \tilde{a}_{\{63\}} & \tilde{a}_{\{64\}} & \tilde{a}_{\{65\}} & 1,1,1 \end{bmatrix}$$

2) Calculation of fuzzy sums by criterion: For each CSF, the sum of the fuzzy values in the corresponding row is calculated:

$$\Sigma l_i = \sum_{j=1}^{n} l_{i,j}$$

$$\Sigma m_i = \sum_{j=1}^{n} m_{i,j}$$

$$\Sigma u_i = \sum_{j=1}^{n} u_{i,j}$$

These values represent the cumulative weight of a CSF relative to the others.

The total sums are then calculated:

$$\Sigma l_{tot} = \sum_{i=1}^{n} \Sigma l_i$$

$$\Sigma m_{tot} = \sum_{i=1}^{n} \Sigma m_i$$

$$\Sigma u_{tot} = \sum_{i=1}^{n} \Sigma u_i$$

3) Calculation of fuzzy synthetic values: Fuzzy synthetic values are obtained through normalization:

$$S_{\{l,i\}} = \Sigma l_i \times \frac{1}{\Sigma u_{tot}}$$

$$S_{\{m,i\}} = \Sigma m_i \times \frac{1}{\Sigma m_{tot}}$$

$$S_{\{u,i\}} = \Sigma u_i \times \frac{1}{\Sigma l_{tot}}$$

These values represent the relative importance of the CSF in a vague form.

4) Defuzzification of weights: To obtain a single usable weight, fuzzy values are converted into simple numerical values using the center-of-gravity method:

$$W_i = \frac{S_{\{l,i\}} + S_{\{m,i\}} + S_{\{u,i\}}}{3}$$

This step provides a numerical value representing the significance of the CSF.

5) Normalization of weights: The weights obtained are then normalized so that their sum equals 1:

$$w_i = \frac{W_i}{\sum_{k=1}^{n} W_k}$$

The weights can then be expressed as a percentage:

$$Weight_i(\%) = 100 * w_i$$

These values correspond to the final relative importance of the CSF in the phase.

V. FINDINGS AND RESULTS

A. Identification of the CSFs for Each Phase of the ERPI

As explained in the literature review, the ERPI process is divided into three main stages, namely: pre-implementation, implementation and post-implementation.

In our research, pre-implementation includes the analysis phase and the design phase. While implementation includes the realization phase and the final preparation phase. The last step is the post-implementation which includes the commissioning and support phase. Table V details the CSFs for each phase of the ERPI.

1) Analysis phase: According to [56], the analysis phase is a key step in the ERPI, as it aims to establish a thorough understanding of the company's needs. This phase allows the scope of the project, the strategic objectives, and the terms of collaboration to be defined. It involves organizing the project kick-off meeting, structuring the project team, analyzing existing documents and processes, and conducting interviews with key users. These activities enable the functional requirements of the organization to be identified, formalized, and validated.

2) Design phase: According to [56], the design phase aims to translate the functional requirements validated during the analysis phase into operational solutions adapted to the ERP. It is based primarily on the functional requirements document and consists of designing the target processes in detail through the preparation and presentation of prototypes of the various ERP modules to be implemented. Workshops are organized with stakeholders to define management and customization rules and any additional features. This phase also allows the data migration strategy and methods to be defined.

3) Realization phase: According to [56], the realization phase involves the practical deployment of the solutions defined during the design phase. This phase includes configuring the various ERP modules to be implemented, carrying out customizations and specific developments, as well as preparing and migrating data to the test environment. Tests are then conducted to verify that the system meets functional and technical requirements. Any detected issues are analyzed and corrected iteratively to ensure the stability and quality of the solution.

4) Final preparation phase: According to [56], the final preparation phase marks the transition period between the technical implementation of the ERP system and its actual deployment. This phase involves organizing training sessions for users to ensure they are able to use the system effectively. It also includes conducting user acceptance testing (UAT) to verify that the ERP system meets functional and operational requirements. Furthermore, any issues detected during UAT are analyzed and corrected, thereby ensuring the system's quality and reliability before it goes live.

5) The commissioning and support phase: According to [56], the commissioning and support phase is the final stage of the ERPP, where the system is deployed in the production environment. This phase is based on the final configuration of the system, the source code for specific and customized developments, the data ready for migration, and the production plan established during the previous phase. The main activities include configuring the production environment, installing the source code, migrating data to the production environment, conducting a production audit to verify system compliance and performance, and setting up post-production support to assist users and resolve any incidents.

Using the action research method, we identified the CSFs that determine the success of ERPI within Moroccan SMEs. In total, we identified nine factors that influence the success of ERPI in this context. Below, we present the main CSFs identified in this study, as well as the phases during which each of these factors exerts an influence throughout the ERPI process.

Management support and involvement are essential to the successful ERPI. This depends on the willingness of executives to provide sufficient and ongoing support for the system implementation process. Management must be fully involved in decision-making, as an ERPP entails significant changes to existing business processes. Management's support for employees is a prerequisite for the acceptance of the new system. Indeed, if management demonstrates commitment to the project, employees will be more inclined to adopt it. Conversely, a lack of buy-in from management can hinder user acceptance. It is therefore crucial that management does not express doubts and that it demonstrates confidence in the system's value. It must also foster an environment conducive to the ERP project's acceptance; otherwise, the project risks being rejected. This factor remains essential throughout all phases of the ERPI.

Involvement of end users and stakeholders is essential to a project's success. Their participation in the implementation process helps to better understand requirements and needs, validate business rules, customization needs, and new features to be developed, as well as test the system and participate in training sessions. Insufficient user participation often leads to project failure, as a lack of representation can result in ill-suited business processes. This factor is essential in the various phases of ERPI, with the exception of the development phase.

Project management is essential to the successful implementation of the ERP. It consists of continuously managing the implementation plan. This includes planning the various stages, determining milestones, allocating responsibilities and defining success criteria. Effective project management ensures that the core activities of the ERPI are given priority and helps to meet deadlines and timelines. This factor is necessary in all phases of the ERPI.

Process reengineering is the process of observing and analyzing how the business operates to determine what changes can be made to streamline its operations. It is a way of examining the current operations of the business to determine the best way to proceed when designing the new system. This factor is necessary in the analysis phase.

Project team competence is essential for ensuring the success of the implementation. The team must possess the skills, knowledge, influence, and experience necessary to carry out the project, in order to effectively manage meetings with users, ask the right questions to define requirements and lead process reengineering, prepare and present the prototype to users, validate with them the management rules and

customization needs for each module, and define the framework for data migration. It is also crucial to identify experts with a deep understanding of the company, its operations, and its objectives to ensure the project's success. This factor is essential throughout all phases of the ERPI.

Change management is essential to the successful ERPI. To address any resistance you may encounter, it is important to help employees understand the benefits of digital transformation that result from the deployment of the new system. Implementing such software within an organization requires a well-thought-out change management process to ensure that the entire company is moving in the same direction. This factor is essential throughout all phases of the ERPI.

Minimal customization is required for the successful ERPI. Customizing an ERP can be really interesting and beneficial, but it can also result in additional costs and an even longer implementation timeline, so it becomes difficult to make upgrades to the latest versions. This factor is necessary in the realization phase.

Configuration ERP deals with the management of numerous usage controls, which can be enabled or disabled, to balance its functionality to the extent necessary. The configuration of these elements is based on the detailed functional specifications to align the ERPS processes with the business processes of the company. The configuration must be performed by people who understand the business and the company's business, and also have a thorough understanding of the solution to be implemented. This factor is necessary in the realization phase.

User training is essential to ensure that the new system is well integrated internally and used correctly. It plays an essential role in improving the performance of the organization. This factor is necessary in the final preparation phase.

Tests are essential for to allow users to verify that the ERP system is functioning properly before it is deployed in the production environment. These tests help identify and resolve any issues that are detected, thereby ensuring the system's reliability when it goes live.

TABLE V. CSFS FOR EACH PHASE OF THE ERPI

CSFs	Analysis	Design	Realization	Final preparation	Commissioning and support
Management support and involvement	✓	✓	✓	✓	✓
Involvement of end users and stakeholders	✓	✓	—	✓	✓
Project management	✓	✓	✓	✓	✓
Process reengineering	✓	—	—	—	—
Project team competence	✓	✓	✓	✓	✓
Change management	✓	✓	✓	✓	✓
Minimal customization	—	—	✓	—	—
Configuration ERP	—	—	✓	—	—
User training	—	—	—	✓	—
Tests	—	—	—	✓	—

B. Priorisation of the CSFs for Each Phase of the ERPI

1) Analysis phase: In the decision-making process, which will utilize the fuzzy AHP method for the analysis phase, the CSFs are coded as CSF1, CSF2, CSF3, CSF4, CSF5 and CSF6. These CSFs and their corresponding codes are presented below (see Table VI):

CSF1: Management support and involvement

CSF2: Involvement of end users and stakeholders

CSF3: Project management

CSF4: Process reengineering

CSF5: Project team competence

CSF6: Change management

TABLE VI. FUZZY PAIRWISE COMPARISON MATRIX OF CRITICAL SUCCESS FACTORS IN THE ANALYSIS PHASE

	CSF1			CSF2			CSF3			CSF4			CSF5			CSF6		
	l	**m**	**u**	**l**	**m**	**u**	**l**	**m**	**u**	**l**	**m**	**u**	**l**	**m**	**u**	**l**	**m**	**u**
CSF1	1	1	1	1,305	1,417	1,529	1,139	1,238	1,337	1,218	1,324	1,431	1,774	1,929	2,083	2,258	2,455	2,651
CSF2	0,654	0,706	0,766	1	1	1	0,873	0,944	1,015	0,933	1,01	1,087	1,357	1,476	1,595	1,728	1,88	2,032
CSF3	0,748	0,808	0,878	0,985	1,059	1,145	1	1	1	1,07	1,157	1,244	1,558	1,694	1,83	1,985	2,158	2,33
CSF4	0,699	0,755	0,821	0,92	0,99	1,072	0,804	0,864	0,935	1	1	1	1,455	1,582	1,709	1,854	2,015	2,176
CSF5	0,48	0,518	0,564	0,627	0,677	0,731	0,546	0,59	0,639	0,585	0,632	0,684	1	1	1	1,274	1,386	1,497
CSF6	0,377	0,407	0,443	0,492	0,532	0,575	0,429	0,463	0,501	0,459	0,496	0,537	0,668	0,721	0,78	1	1	1

TABLE VII. FUZZY SYNTHETIC EXTENT VALUES AND RELATIVE IMPORTANCE WEIGHTS OF CRITICAL SUCCESS FACTORS IN THE ANALYSIS PHASE

	Σl	Σm	Σu	1/Σu	1/Σm	1/Σl	S_l	S_m	S_u	W	%
CSF1	8,694	9,363	10,031	0,023	0,025	0,027	0,2	0,234	0,271	0,23	23
CSF2	6,545	7,016	7,495	0,023	0,025	0,027	0,151	0,175	0,202	0,18	18
CSF3	7,346	7,876	8,427	0,023	0,025	0,027	0,169	0,197	0,228	0,2	20
CSF4	6,732	7,206	7,713	0,023	0,025	0,027	0,155	0,18	0,208	0,18	18
CSF5	4,512	4,803	5,115	0,023	0,025	0,027	0,104	0,12	0,138	0,12	12
CSF6	3,425	3,619	3,836	0,023	0,025	0,027	0,079	0,09	0,104	0,09	9
Sum	37,254	39,883	42,617								

The results show that CSF1 is the most important CSF during this phase, accounting for 23% of the total. This underscores the importance of management's commitment to decision-making, allocating the necessary resources, resolving issues, and ensuring clear communication and employee support to foster acceptance of the new ERP system (see Table VII).

The second most important factor in this phase is CSF3, which accounts for 20% of the total. Effective project management is essential to ensure that all activities in this phase are properly planned and executed on time, in order to meet the project's objectives. This is why it is necessary to have a competent project manager who can assign responsibilities, manage resources, and ensure clear communication with all stakeholders.

Factors CSF2 and CSF4 rank third, each at 18%. User involvement provides a better understanding of the company's processes, specific needs, and the issues and challenges it faces. Furthermore, process reengineering helps identify and optimize business processes in order to align them with the requirements of the ERP system.

Next, CSF5 accounts for 12%, indicating that the project team's competence remains essential for effectively managing meetings with users, asking the right questions to define requirements, and reengineering processes.

Finally, CSF6 has the lowest weight at 9%. This explains why activities related to change management tend to become more important during the later phases of ERPI.

2) Design phase: In the decision-making process, which will utilize the fuzzy AHP method for the design phase, the CSFs are coded as CSF1, CSF2, CSF3, CSF4, and CSF5. These CSFs and their corresponding codes are presented below (see Table VIII):

CSF1: Management support and involvement

CSF2: Involvement of end users and stakeholders

CSF3: Project management

CSF4: Project team competence

CSF5: Change management

TABLE VIII. FUZZY PAIRWISE COMPARISON MATRIX OF CRITICAL SUCCESS FACTORS IN THE DESIGN PHASE

	CSF1			CSF2			CSF3			CSF4			CSF5		
	l	m	u	l	m	u	l	m	u	l	m	u	L	m	u
CSF1	1	1	1	0,846	0,917	0,987	0,599	0,65	0,702	0,735	0,798	0,861	1,057	1,146	1,234
CSF2	1,013	1,091	1,182	1	1	1	0,708	0,769	0,83	0,869	0,944	1,018	1,249	1,354	1,458
CSF3	1,425	1,538	1,67	1,205	1,3	1,412	1	1	1	1,228	1,333	1,438	1,765	1,913	2,06
CSF4	1,161	1,253	1,361	0,982	1,059	1,151	0,695	0,75	0,814	1	1	1	1,438	1,559	1,679
CSF5	0,81	0,873	0,946	0,686	0,738	0,801	0,485	0,523	0,567	0,596	0,641	0,695	1	1	1

TABLE IX. FUZZY SYNTHETIC EXTENT VALUES AND RELATIVE IMPORTANCE WEIGHTS OF CRITICAL SUCCESS FACTORS IN THE DESIGN PHASE

	Σl	Σm	Σu	1/Σu	1/Σm	1/Σl	S_l	S_m	S_u	W	%
CSF1	4,237	4,511	4,784	0,036	0,038	0,041	0,153	0,171	0,196	0,17	17
CSF2	4,839	5,158	5,488	0,036	0,038	0,041	0,174	0,196	0,225	0,2	20
CSF3	6,623	7,084	7,58	0,036	0,038	0,041	0,238	0,269	0,311	0,27	27
CSF4	5,276	5,621	6,005	0,036	0,038	0,041	0,19	0,214	0,246	0,22	22
CSF5	3,577	3,775	4,009	0,036	0,038	0,041	0,129	0,143	0,164	0,14	14
Sum	24,552	26,149	27,866								

The results show that CSF3 is the most important CSF during this phase, accounting for 27% of the total. Effective project management is essential to ensure that all activities in this phase are properly planned and executed on time, in order to meet the project's objectives. This is why it is necessary to have a competent project manager who can assign responsibilities, manage resources, and ensure clear communication with all stakeholders.

The second most important factor is CSF4, which accounts for 22% of the total. Project team competence is essential for effectively preparing and presenting the prototype to users, facilitating meetings with them, asking the right questions to identify the management rules and customization needs for each module, and defining the framework for data migration.

Next, the CSF2 accounts for 20%. The involvement of end users and stakeholders is essential for understanding requirements, needs, issues, and challenges, as well as for validating business rules, customization needs, and new features to be developed. It also helps ensure that the ERP effectively meets the organization's actual needs.

CSF1 accounts for 17%. Although management support and involvement are essential for making decisions, managing resources, resolving issues, ensuring clear communication, and supporting employees to foster acceptance of the new ERP system, their influence is slightly less decisive in this phase compared to other factors.

Finally, CSF5 accounts for 14% of the weight. The importance of change management begins to grow during the final phases of the project in order to help prepare employees for the changes brought about by the implementation of the ERP system and to minimize resistance (see Table IX).

3) Realization phase: In this decision-making process, which will utilize the fuzzy AHP method for the realization phase, the CSFs are coded as CSF1, CSF2, CSF3, CSF4, CSF5, and CSF6. These CSFs and their corresponding codes are presented below (see Table X):

CSF1: Management support and involvement

CSF2: Project management

CSF3: Project team competence

CSF4: Change management

CSF5: Minimal customization

CSF6: Configuration

The results show that CSF6 is the most important CSF in this phase, accounting for 24% of the total. Proper ERP configuration is essential for aligning business processes with the ERP in order to meet the organization's needs and requirements (see Table XI).

TABLE X. FUZZY PAIRWISE COMPARISON MATRIX OF CRITICAL SUCCESS FACTORS IN THE REALIZATION PHASE

	CSF1			CSF2			CSF3			CSF4			CSF5			CSF6		
	l	m	u	l	m	u	l	m	u	l	m	u	l	m	u	l	m	u
CSF1	1	1	1	0,394	0,429	0,463	0,436	0,474	0,512	0,69	0,75	0,81	0,552	0,6	0,648	0,345	0,375	0,405
CSF2	2,16	2,333	2,536	1	1	1	1,017	1,105	1,194	1,61	1,75	1,89	1,288	1,4	1,512	0,805	0,875	0,945
CSF3	1,955	2,111	2,295	0,838	0,905	0,983	1	1	1	1,457	1,583	1,71	1,165	1,267	1,368	0,728	0,792	0,855
CSF4	1,235	1,333	1,449	0,529	0,571	0,621	0,585	0,632	0,686	1	1	1	0,736	0,8	0,864	0,46	0,5	0,54
CSF5	1,543	1,667	1,812	0,661	0,714	0,776	0,731	0,789	0,858	1,157	1,25	1,359	1	1	1	0,575	0,625	0,675
CSF6	2,469	2,667	2,899	1,058	1,143	1,242	1,17	1,263	1,373	1,852	2	2,174	1,481	1,6	1,739	1	1	1

TABLE XI. FUZZY SYNTHETIC EXTENT VALUES AND RELATIVE IMPORTANCE WEIGHTS OF CRITICAL SUCCESS FACTORS IN THE REALIZATION PHASE

	Σl	Σm	Σu	1/Σu	1/Σm	1/Σl	S_l	S_m	S_u	W	%
CSF1	3,417	3,628	3,838	0,023	0,025	0,027	0,079	0,091	0,104	0,09	9
CSF2	7,88	8,463	9,077	0,023	0,025	0,027	0,181	0,212	0,245	0,21	21
CSF3	7,143	7,658	8,211	0,023	0,025	0,027	0,164	0,191	0,222	0,19	19
CSF4	4,545	4,836	5,16	0,023	0,025	0,027	0,105	0,121	0,139	0,12	12
CSF5	5,667	6,045	6,48	0,023	0,025	0,027	0,13	0,151	0,175	0,15	15
CSF6	9,03	9,673	10,427	0,023	0,025	0,027	0,208	0,242	0,282	0,24	24
Sum	37,682	40,303	43,193								

The second most important factor is CSF2, accounting for 21%. Effective project management is essential to ensure that all activities in this phase are properly planned and executed on time, in order to meet the project's objectives. This is why it is necessary to have a competent project manager who can assign responsibilities, manage resources, and ensure clear communication with all stakeholders.

Next, CSF3 accounts for 19%. Project team competence is essential to properly configure and customize the ERP, as well

as to migrate data, perform tests, and resolve any issues detected during those tests.

The CSF5 is assigned a weight of 15%. Minimal customization is essential to avoid complicating upgrades to new versions of the ERP system, thereby reducing costs and simplifying future upgrades.

Furthermore, CSF4 is assigned a weight of 12%. Although change management is essential for preparing users and helping them adopt the new system, its importance generally becomes more critical in later phases.

Finally, CSF1 receives the lowest weighting, 9% in this phase. Although management support and involvement are essential for making decisions, managing resources, resolving issues, ensuring clear communication, and supporting employees to foster acceptance of the new ERP system, their influence is slightly less decisive in this phase compared to other factors.

4) Final preparation phase: In the decision-making process, which will utilize the fuzzy AHP method for the realization phase, the CSFs are coded as CSF1, CSF2, CSF3, CSF4, CSF5, CSF6, and CSF7. These CSFs and their corresponding codes are presented below (see Table XII):

CSF1: Management support and involvement

CSF2: Involvement of end users and stakeholders

CSF3: Project management

CSF4: Project team competence

CSF5: Change management

CSF6: User training

CSF7: Tests

TABLE XII. FUZZY PAIRWISE COMPARISON MATRIX OF CRITICAL SUCCESS FACTORS IN THE FINAL PREPARATION PHASE

	CSF1			CSF2			CSF3			CSF4			CSF5			CSF6			CSF7		
	l	m	u	l	m	u	l	m	u	l	m	u	l	m	u	l	m	u	l	m	u
CSF 1	1	1	1	0,328	0,357	0,386	0,41	0,446	0,482	0,615	0,669	0,723	0,273	0,297	0,321	0,223	0,243	0,263	0,246	0,268	0,29
CSF 2	2,591	2,8	3,049	1	1	1	1,25	1,357	1,464	1,875	2,036	2,196	0,833	0,905	0,976	0,682	0,741	0,8	0,75	0,815	0,879
CSF 3	2,074	2,241	2,439	0,683	0,737	0,8	1	1	1	1,5	1,629	1,757	0,667	0,724	0,781	0,545	0,592	0,638	0,6	0,652	0,703
CSF 4	1,383	1,495	1,626	0,455	0,491	0,533	0,569	0,614	0,667	1	1	1	0,379	0,412	0,444	0,31	0,337	0,364	0,341	0,37	0,4
CSF 5	3,115	3,367	3,663	1,025	1,105	1,2	1,28	1,381	1,499	2,25	2,429	2,637	1	1	1	0,818	0,889	0,96	0,9	0,978	1,056
CSF 6	3,802	4,111	4,474	1,25	1,35	1,466	1,567	1,688	1,835	2,75	2,964	3,214	1,042	1,125	1,222	1	1	1	1,1	1,196	1,291
CSF 7	3,447	3,731	4,065	1,138	1,227	1,333	1,423	1,534	1,667	2,5	2,703	2,933	0,947	1,022	1,111	0,775	0,836	0,909	1	1	1

TABLE XIII. FUZZY SYNTHETIC EXTENT VALUES AND RELATIVE IMPORTANCE WEIGHTS OF CRITICAL SUCCESS FACTORS IN THE FINAL PREPARATION PHASE

	Σl	Σm	Σu	1/Σu	1/Σm	1/Σl	S_l	S_m	S_u	W	%
CSF1	2,849	3,012	3,175	0,016	0,018	0,019	0,046	0,054	0,06	0,05	5
CSF2	8,231	8,839	9,485	0,016	0,018	0,019	0,132	0,159	0,18	0,15	15
CSF3	6,469	6,923	7,415	0,016	0,018	0,019	0,104	0,125	0,141	0,12	12
CSF4	4,096	4,349	4,634	0,016	0,018	0,019	0,066	0,078	0,088	0,08	8
CSF5	9,488	10,171	10,959	0,016	0,018	0,019	0,152	0,183	0,208	0,18	18
CSF6	11,411	12,238	13,211	0,016	0,018	0,019	0,183	0,22	0,251	0,22	22
CSF7	10,23	11,053	12,018	0,016	0,018	0,019	0,164	0,199	0,228	0,2	20
Sum	52,774	56,585	60,897								

The results indicate that CSF6 is the most important CSF in this phase, with a weight of 22%. User training is essential, as this phase precedes the implementation of the ERP system in the production environment. It is therefore important to thoroughly train users on how to use the new ERP system, which helps reduce errors during use and also facilitates its adoption (see Table XIII).

The second most important factor CSF7, accounting for 20%. Testing is essential to allow users to test and verify that the ERP is functioning properly before it is deployed in the production environment. These tests help identify and correct any issues that are detected, ensuring the system's reliability when it goes live.

Next, CSF5 accounts for 18%. Change management is becoming increasingly important in helping to prepare employees for the changes brought about by the implementation of the ERP system, as well as in minimizing resistance to change.

The CSF2 is weighted at 15%. The involvement of end users and stakeholders is essential during training sessions and testing to ensure that the new ERP system meets the organization's needs.

Furthermore, CSF3 accounts for 12%. Effective project management is essential to ensure that all activities in this phase are properly planned and executed on time, in order to meet the project's objectives. This is why it is necessary to have a competent project manager who can assign responsibilities, manage resources, and ensure clear communication with all stakeholders.

Next, CSF4 accounts for 8%. Project team competence is essential for effectively training users, conducting user testing, and resolving issues identified during testing.

Finally, CSF1 receives the lowest weighting, 5%, in this phase. Although management support and involvement are essential for making decisions, managing resources, resolving issues, ensuring clear communication, and supporting employees to foster acceptance of the new ERP system, their influence is slightly less decisive in this phase compared to other factors.

5) Commissioning and support phase: In the decision-making process, which will utilize the fuzzy AHP method for the commissioning and support phase, the CSFs are coded as CSF1, CSF2, CSF3, CSF4, and CSF5. These CSFs and their corresponding codes are presented below (see Table XIV).

CSF1: Management support and involvement

CSF2: Involvement of end users and stakeholders

CSF3: Project management

CSF4: Project team competence

CSF5: Change management

The results indicate that CSF5 is the most important CSF in this phase, accounting for 27% of the total. During this phase, employees begin to use the new ERP, which entails changes to the organization's business processes. Change management is essential during this phase to help employees adapt to the changes brought about by the implementation of the ERP and to minimize resistance to change (see Table XV).

TABLE XIV. FUZZY PAIRWISE COMPARISON MATRIX OF CRITICAL SUCCESS FACTORS IN THE COMMISSIONING AND SUPPORT PHASE

	CSF1			CSF2			CSF3			CSF4			CSF5		
	l	**m**	**u**	**l**	**m**	**u**	**l**	**m**	**u**	**l**	**m**	**u**	**l**	**m**	**u**
CSF1	1	1	1	0,56	0,608	0,656	0,723	0,786	0,849	0,647	0,703	0,759	0,46	0,5	0,54
CSF2	1,524	1,645	1,786	1	1	1	1,312	1,429	1,545	1,174	1,278	1,382	0,746	0,811	0,876
CSF3	1,178	1,273	1,383	0,647	0,7	0,762	1	1	1	0,891	0,969	1,047	0,566	0,615	0,664
CSF4	1,317	1,423	1,545	0,724	0,783	0,852	0,955	1,032	1,122	1	1	1	0,635	0,69	0,745
CSF5	1,852	2	2,174	1,142	1,233	1,339	1,506	1,625	1,758	1,342	1,457	1,576	1	1	1

TABLE XV. FUZZY SYNTHETIC EXTENT VALUES AND RELATIVE IMPORTANCE WEIGHTS OF CRITICAL SUCCESS FACTORS IN THE COMMISSIONING AND SUPPORT PHASE.

	Σl	**Σm**	**Σu**	**1/Σu**	**1/Σm**	**1/Σl**	**S_l**	**S_m**	**S_u**	**W**	**%**
CSF1	3,39	3,597	3,804	0,035	0,038	0,04	0,119	0,137	0,152	0,14	14
CSF2	5,756	6,163	6,589	0,035	0,038	0,04	0,201	0,234	0,264	0,23	23
CSF3	4,282	4,557	4,856	0,035	0,038	0,04	0,15	0,173	0,194	0,17	17
CSF4	4,631	4,928	5,264	0,035	0,038	0,04	0,162	0,187	0,211	0,19	19
CSF5	6,842	7,315	7,847	0,035	0,038	0,04	0,239	0,278	0,314	0,27	27
Sum	24,901	26,56	28,36								

The second most important factor is CSF2, accounting for 23%. The involvement of end users and stakeholders is essential for getting the system up and running, as it allows for the rapid identification of operational issues and anomalies, thereby contributing to the system's continuous improvement after implementation.

Next, the CSF4 accounts for 19%. Project team competence is essential for properly configuring the production environment, implementing customizations, migrating data, assisting users, and resolving any issues that arise.

The CSF3 accounts for 17%. Effective project management is essential to ensure that all activities in this phase are properly planned and executed on time, in order to meet the project's objectives. This is why it is necessary to have a competent project manager who can assign responsibilities, manage resources, and ensure clear communication with all stakeholders.

Finally, CSF1 account for 14% of the total. Although management support and involvement are essential for making decisions, managing resources, resolving issues, ensuring clear communication, and supporting employees to foster acceptance

of the new ERP system, their influence is slightly less decisive in this phase compared to other factors.

C. Changes in CSFs Across ERPI Phases

To better understand the dynamics of ERPPs, CSFs have been classified into four main categories: strategic factors, organizational factors, project management factors, and technological factors. Analysis of the results shows that the relative importance of these categories varies significantly across the different phases of ERPI (see Table XVI).

During the analysis phase, strategic factors emerge as the most critical. Management support and involvement are the most important factors, as they enable the project's direction to be defined, the necessary resources to be mobilized, and the alignment of the ERP with the company's overall strategy to be ensured. Factors related to project management and process reengineering also play a key role in the initial structuring of the project.

During the design phase, organizational factors and factors related to project management take on greater importance. Project management and the project team competence are central to this phase, as they enable the organizational needs identified during the analysis phase to be transformed into appropriate functional solutions.

During the implementation phase, technological factors take center stage. The configuration ERP is the primary critical factor, followed by project management and the project team's competence. This phase is characterized by technical activities such as configuration and development.

During the final preparation phase, the importance of organizational factors becomes increasingly evident through user training and testing activities. These factors help prepare the organization for the actual use of the ERP and reduce the risks associated with the go-live.

Finally, during the implementation and support phase, organizational factors related to change management and end-user engagement become critical. These factors help foster acceptance of the system, support users as they adapt to new processes, and ensure the continued operation of the ERP.

The study's findings show that CSFs do not carry the same weight throughout the ERPP. Their priority shifts according to the specific requirements of each implementation phase. Strategic factors dominate the analysis phase, while project management and technological factors become more important during the design and implementation phases. Finally, organizational factors take on major importance during the final preparation and system deployment phases.

TABLE XVI. CHANGES IN CSFS ACROSS ERPI PHASES

	Analysis	Design	Realization	Final preparation	Commissioning and support
Management support and involvement	23 %	17 %	9 %	5 %	14 %
Involvement of end users and stakeholders	18 %	20 %	—	15 %	23 %
Project management	20 %	27 %	21 %	12 %	17 %
Process reengineering	18 %	—	—	—	—
Project team competence	12 %	22 %	19 %	8 %	19 %
Change management	9 %	14 %	12 %	18 %	27 %
Minimal customization	—	—	15 %	—	—
Configuration	—	—	24 %	—	—
User training	—	—	—	22 %	—
Tests	—	—	—	20 %	—

VI. DISCUSSION

To provide a deeper understanding of the results obtained, this section discusses them in relation to previous research on the CSFs of ERPI projects. The analysis highlights both areas of agreement with the existing literature and specific contributions related to the phased approach adopted in this study.

First, the results confirm the importance of strategic factors during the ERPP analysis phase. In particular, the support and involvement of senior management emerge as a determining factor for the project's success. This finding aligns with the conclusions of several previous studies that emphasize the central role of management commitment in defining the project vision, allocating the necessary resources, and aligning the ERP with the company's overall strategy [19,28,46].

Furthermore, the results show that factors related to project management and technological factors become increasingly important during the design and implementation phases. Efficient project management, the project team competence, and the configuration of the ERP emerge as essential elements for transforming organizational needs into appropriate functional and technical solutions. These conclusions are consistent with the studies by [18,33,38], who highlight the key role of project planning, the team's technical skills, and proper system configuration in the success of ERPI.

Furthermore, the study highlights the growing importance of organizational factors in the final phases of the project, particularly during the final preparation phase and the implementation and support phase. User training, change management, and end-user involvement appear to be essential conditions for promoting system adoption and ensuring its continued use. These results confirm the findings of several

studies emphasizing that the success of an ERPP depends not only on technical aspects but also on the organization's ability to support the organizational transformations brought about by the system's implementation [47,48].

Overall, the main contribution of this research lies in highlighting how CSFs evolve over the course of an ERPP lifecycle. Unlike many studies that analyze CSFs in a general manner, this research shows that their relative importance varies across the different phases of the implementation process. This phase-based approach provides a more nuanced understanding of the conditions for ERPP success and offers practical guidance to decision-makers and consultants involved in the implementation of ERP within Moroccan SMEs.

VII. Research Contributions and Limitations

This work makes several contributions, both theoretical and practical.

From a theoretical standpoint, this research:

- Complements the existing literature, which generally analyzes CSFs in a broad sense, by introducing a phase-based analysis of the ERPP.
- Offers a dynamic approach to CSFs by demonstrating that their relative importance changes across the different phases of the ERPI process.
- Contributes to an improved understanding of the ERPI process by highlighting the specific role of strategic, organizational, project management, and technological factors at each phase of the project.

From a practical standpoint, this research:

- Provides ERP consultants and project managers with a clear overview of the factors to prioritize at each stage of the project.
- Helps ERP consultants and project managers better tailor their support strategies to the specific requirements of each implementation phase.
- Contributes to reducing the risk of ERPP failure by identifying the CSFs that ensure a successful system deployment.

Our research has certain limitations:

- It was limited to Moroccan SMEs.
- The action research method is used in only two enterprises.

VIII. Conclusion and Future Works

The objective of this study is to identify the CSFs associated with each phase of the ERPI process, as well as to determine their relative importance in each of these phases within Moroccan SMEs.

In this research, we adopted a mixed-methods approach. The action research method was used to identify the CSFs associated with each phase of the ERPI process within Moroccan SMEs. Additionally, we used the Fuzzy AHP method to determine their relative importance in each of these phases.

The results indicate that the importance of CSFs varies across the different phases of ERPI. During the analysis phase, strategic factors are paramount, while those related to project management and technology gain importance during the design and implementation phases. Finally, organizational factors play a crucial role during the final preparation phase, as well as during the implementation and support phase.

This work provides numerous themes for future research:

- Expand this study to include a larger number of Moroccan SMEs.
- Expand this study to include enterprises of other sizes and other countries.
- Examine the importance of CSFs after the ERPI.
- Examine the challenges that hinder the success of ERPI in the context of Moroccan SMEs.

References

[1] Al-Mashari, M., Zairi, M., 2000. Supply-chain re-engineering using enterprise resource planning

[2] EL MRINI, Y., BELAISSAOUI, M., & TAQAFI, I. Difficultés liées à la mise en œuvre des ERPs au Maroc: Focus sur Gouvernance.

[3] Malhotra, R. and Temponi, C., 2010. Critical decisions for ERP integration: small business issues. International Journal of Information Management, 30 (1), 28–37.

[4] Upadhyay, P., Jahanyan, S., and Dan, P.K., 2011. Factors influencing ERP implementation in Indian manufacturing organisations: a study of micro, small and medium-scale enterprises. Journal of Enterprise Information Management, 24 (2), 130–145.

[5] Olson, D.L. and Staley, J., 2012. Case study of open-source enterprise resource planning implementation in a small business. Enterprise Information Systems, 6 (1), 79–94.

[6] A. Jones, J. Robinson, B. O'Toole, and D. Webb, "Implementing a bespoke supply chain management system to deliver tangible benefits," International Journal of Advanced Manufacturing Technology, vol. 30, no. 9/10, pp. 927–937, 2006, DOI: 10.1007/s00170-005-0065-2.

[7] Ngai, E. W. T., Cheng, T. C. E., & Ho, S. S. (2004). Critical success factors of web-based supply-chain management systems: an exploratory study. Production Planning & Control, 15(6), 622-630.

[8] Markus, M. L., & Robey, D. (1988). Information technology and organizational change: Causal structure in theory and research. Management science, 34(5), 583-598.

[9] Newman, M., & Robey, D. (1992). A social process model of user-analyst relationships. MIS quarterly, 249-266.

[10] Capaldo, G. & Rippa, P. (2009)."A PlannedOriented Approach for ERP Implementation Strategy Selection," Journal of Enterprise Information Management, Vol. 22, No. 6, pp. 642-659.

[11] Esteves, J. M. & Pastor, J. A. (1999)."An ERP life-Cycle-Based Research Agenda," First International Workshop in Enterprise Management and Resource Planning: Methods, Tools and Architectures (EMRPS), Venice, Italy.

[12] Ross, J. W., & Vitale, M. R. (2000). The ERP revolution: surviving vs. thriving. Information systems frontiers, 2(2), 233-241.

[13] Markus, M. L., & Tanis, C. (2000). The enterprise systems experience-from adoption to success. Framing the domains of IT research: Glimpsing the future through the past, 173(2000), 207-173.

[14] Parr, A. & Shanks, G. (2000)."A Model of ERP Project Implementation," Journal of Information Technology.

[15] Shanks, G., Parr, A., Hu, B., Corbitt, B., Thanasankit, T., & Seddon, P. (2000). Differences in critical success factors in ERP systems

implementation in Australia and China: a cultural analysis. ECIS 2000 Proceedings, 53.

[16] Somers, T. M. & Nelson, K. G. (2004)."A Taxonomy of Players and Activities across the ERP Project life Cycle," Information and Management.

[17] Peslak, A. R., Subramanian, G. H., & Clayton, G. E. (2008). The phases of ERP software implementation and maintenance: A model for predicting preferred ERP use. Journal of Computer information systems, 48(2), 25-33.

[18] Yusuf, Y., Gunasekaran, A., & Wu, C. (2006). Implementation of enterprise resource planning in China. Technovation, 26(12), 1324-1336.

[19] Umble, E. J., Haft, R. R. (2003)."Enterprise Resource Planning: implementation Procedures and Critical Success Factors," European Journal of Operational Research.

[20] Mengistie, A. A., Heaton, D. P., & Rainforth, M. (2012). Analysis of the critical success factors for ERP systems implementation in US Federal Ofces. In F. Piazolo & M. [21] Felderer (Eds.), Innovation and future of enterprise information systems (pp. 183–198). Salzburg: Springer

[21] Lin, Y.-C., Lee, M.-H., & Tsernng, H. P. (2003). Construction enterprise resource planning implementation: critical success factors-lesson learning in Taiwan. 20th International Symposium on Automation and Robotics in Construction ISARC, pp 623–628.

[22] Kronbichler, S. A., Ostermann, H., & Staudinger, R. (2009). A review of critical success factors for ERP-projects. The Open Information Systems Journal, 3(1), 14–25.

[23] Anto, J. (2016). An empirical study of enterprise resource planning systems in construction industry. International Research Journal of Engineering and Technology, 3(4), 1310–1315.

[24] Chung, B. Y., Skibniewski, M. J., Lucas, H. C., & Kwak, Y. H. (2008). Analyzing enterprise resource planning system implementation success factors in the engineering-construction industry. Journal of Computing in Civil Engineering, 22(6), 373–382.

[25] Ara, A., & Al-Mudimigh, A. S. (2011). The role and impact of project management in ERP project implementation life cycle. Global Journal of Computer Science and Technology, 11(5), 6–10.

[26] Akkermans, H., & van Helden, K. (2002). Vicious and virtuous cycles in ERP implementation: a case study of interrelations between critical success factors. European Journal of Information Systems, 11(1), 35–46.

[27] Brown, C., & Vessey, I. (1999). ERP implementation approaches: toward a contingency framework. ICIS 1999 Proceedings, 39.

[28] Holland, C. R., & Light, B. (1999). A critical success factors model for ERP implementation. IEEE software, 16(3), 30-36.

[29] Esteves, J. & Pastor, J. (2000)."Toward the Unification of Critical Success Factors for ERP Implementation," Proceedings of the 10th Annual Business Information Technology (BIT) Conference, Manchester, UK.

[30] Roseman, M., Sedera, W. & Gable, G. (2001)."Critical Success Factors of Process Modeling for Enterprise Systems," Proceedings of the Americas Conference on Information Systems, Boston, Massachusetts.

[31] Allen, D., Kern, T. & Havenhand, M. (2002)."ERP Critical Success Factors: An Exploration of the Contextual Factors in Public Sector Institution," Proceedings of the 35th Hawaii International Conference on System Sciences.

[32] Wenrich, K., & Ahmad, N. (2009). Lessons learned during a decade of ERP experience: A case study. International Journal of Enterprise Information Systems (IJEIS), 5(1), 55-73.

[33] Soja, P. (2006). Success factors in ERP systems implementations: lessons from practice. Journal of enterprise information management.

[34] Yusuf, Y., Gunasekaran, A., & Wu, C. (2006). Implementation of enterprise resource planning in China. Technovation, 26(12), 1324-1336.

[35] Umble, E. J., Haft, R. R. & Umble, M. M. (2003)."Enterprise Resource Planning: implementation Procedures and Critical Success Factors," European Journal of Operational Research.

[36] Ali, M. (2017). Developing in-house ERP system for the construction industry in a developing country: a case study. Engineering Management Research, 6(1), 90.

[37] Motwani, J., Akbul, A.Y., & Nidumolu, V. (2005)."Successful Implementation of ERP Systems: a Case Study of an International Automotive Manufacturer," International Journal of Automotive Technology and Management.

[38] Hong, K. K., & Kim, Y. G. (2002). The critical success factors for ERP implementation: an organizational fit perspective. Information & management, 40(1), 25-40.

[39] Kale, P., Banwait, S., & Laroiya, S. (2007). Enterprise resource planning implementation in Indian SMEs: Issues and challenges, pp. 242–248. https://www.csi-sigegov.org/critical_pdf/27_242-248. pdf. Accessed 30 May 2019.

[40] Ahmed, S.M., Ahmad, I., Azhar, S., & Mallikarjuna, S. (2003). Implementation of enterprise resource planning (ERP) systems in the construction industry. In: Construction Research Congress, American Society of Civil Engineers, Reston, VA, pp 1–8.

[41] Tsai, W.- H., Chien, S.- W., Hsu, P.- Y. & Leu, J.- D. (2005)."Identification of Critical Failure Factors in the Implementation of Enterprise Resource Planning (ERP) System in Taiwan's Industries," International Journal of Management and Enterprise Development.

[42] Voordijk, H., Van Leuven, A., & Laan, A. (2003). Enterprise resource planning in a large construction frm: implementation analysis. Construction Management and Economics, 21(5), 511–521.

[43] Chan, C.T.W., & Sin, H.C. (2010). Critical success factors for ERP implementation in Chinese construction companies. In: 2010 8th IEEE international conference on industrial informatics, IEEE, pp 628–633.

[44] Wu, J. H., & Wang, Y. M. (2007). Measuring ERP success: The key-users' viewpoint of the ERP to produce a viable IS in the organization. Computers in Human behavior, 23(3), 1582-1596.

[45] Kumar, V., Maheshwari, B., & Kumar, U. (2003). An investigation of critical management issues in ERP implementation: emperical evidence from Canadian organizations. Technovation, 23(10), 793-807.

[46] Al-Mashari, M., Al-Mudimigh, A. & Zairi, M. (2003)."Enterprise Resource Planning: A Taxonomy of critical factors," European Journal of Operational Research.

[47] Sun, A. Y., Yazdani, A., & Overend, J. D. (2005). Achievement assessment for enterprise resource planning (ERP) system implementations based on critical success factors (CSFs). International journal of production economics, 98(2), 189-203.

[48] Amini, M., & Sadat Safavi, N. (2013). Critical success factors for ERP implementation. International Journal of Information Technology and Information Systems, 5(15), 1–23.

[49] Chung, B. (2007). An analysis of success and failure factors for ERP systems in engineering and construction frms. Doctoral Thesis. University of Maryland.

[50] Shi, J. J., & Halpin, D. W. (2003). Enterprise resource planning for construction business management. Journal of Construction Engineering and Management, 129(2), 214–221.

[51] Bano, F. (2014). Quality of ERP implementation: case study of select indian organizations. International Proceedings of Economics Development and Research, 75(9), 36–39.

[52] Benbasat, I., Goldstein, D. K., & Mead, M. (1987). The case research strategy in studies of information systems. MIS quarterly, 369-386.

[53] Soulard, C. T., Compagnone, C., & Lémery, B. (2007). La recherche en partenariat: entre fiction et friction. Natures sciences sociétés, 15(1), 13-22.

[54] Saaty, T. L. (1980). The analytic hierarchy process.

[55] Chang, D. Y. (1996). Applications of the extent analysis method on fuzzy AHP. European journal of operational research, 95(3), 649-655.

[56] ZOUHAIR, Y., EL MRINI, Y., & BELAISSAOUI, M. (2026). Framework for Implementing ERP Integrating Client-Consultant Agency Management within Moroccan SMEs. International Journal of Advanced Computer Science & Applications, 17(3), 838.