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Prioritizing Organizational Preparation before Technical Development: An Exploratory ERP Implementation Methodology for Manufacturing Companies

Kasturi Kanchymalay[1*], Ummi Raba'ah Hashim[1] , Ramesh Krishnan[2] , Koe Wei Loon[2], Najma Imtiaz Ali Brohi[1] , Abdul Karim Mohamad[1],

[1]Faculty of Information and Communication Technology, Universiti Teknikal Malaysia Melaka, Malaysia

[2]Faculty of Business & Management, Universiti Teknologi MARA, Malaysia

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ABSTRACT

Enterprise Resource Planning (ERP) systems are frequently managed as technology projects, yet their implementation reshapes how people, processes and decisions are organized, and many projects still fall short of expectations. This exploratory study examines how four manufacturing companies in Malaysia implemented ERP and whether the importance they attached to different implementation steps was associated with the benefits they reported. Interviews with ERP project managers and lead consultants captured project characteristics and rated the importance of 26 implementation steps on a 0–9 scale, while a survey of active ERP users rated five categories of organizational benefit on a 1–5 scale. The companies differed in the number of sites, the alignment between business process reengineering and the ERP package, the degree of customization, the module strategy and the project timeline, yet all carried out the same activities, which correspond to a five-stage model. Because the design is observational, uncontrolled and based on perceptual data, the findings are descriptive. Higher perceived importance of organizational preparation tended to accompany higher operational and organizational benefits, and higher importance of technical development accompanied mainly operational benefit, whereas managerial, strategic and IT infrastructure benefits showed no consistent pattern. Drawing on literature on benefit realization, post-implementation governance and digital maturity, the paper offers a tentative explanation: operational and organizational benefits are proximal outcomes of process fit and people readiness, whereas managerial and strategic benefits depend on sustained governance and organizational capability after go-live. On this basis, a preliminary two-domain heuristic is proposed in which Organizational Preparation is completed before Technical Development begins. The heuristic is a hypothesis for validation, not a definitive rule, and pathways for quantitative testing with objective performance metrics and larger samples are outlined.

Keywords: ERP implementation; organizational preparation; technical development; manufacturing firms; business process reengineering

INTRODUCTION

Enterprise Resource Planning (ERP) systems integrate finance, production, procurement, inventory, sales and human resource processes on a shared database, and they have become the digital backbone of many manufacturing organizations (Milojevic & Skerlic, 2025). Despite this widespread adoption, implementing an ERP system remains a complex and high-risk undertaking that is often accompanied by cost overruns, schedule delays and organizational friction (Grabski & Leech, 2007; Moon, 2007). Failure rates between 50% and 70% are frequently cited in the literature, and the most common explanation is that organizations treat ERP as an information technology (IT) upgrade rather than as a business transformation (Finney & Corbett, 2007; Gargeya & Brady, 2005).

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Recent evidence points in the same direction. The most extensive update of the critical success factor (CSF) literature to date, covering 272 studies, concludes that the majority of the important success factors are organizational and strategic in nature, even though technological factors must still be coordinated with them (Leyh et al., 2025). Other reviews likewise emphasize that outcomes depend on balancing technical execution with non-technical conditions such as change readiness, executive sponsorship and workflow alignment (Muftiadi, 2025; Talo & Emanuel, 2025). Because organizational structures and work practices differ widely between manufacturing firms, a single uniform deployment method is unlikely to succeed everywhere.

Stage-based implementation models describe what activities an ERP project should contain, but they say little about how organizations prioritize those activities and whether those priorities matter for the benefits that are eventually realized. In addition, most models treat organizational and technical activities as one continuous sequence, which makes it difficult for managers to judge whether the organization is ready for the technical work that follows. This study addresses that gap by comparing four manufacturing companies in Malaysia that carried out the same implementation activities but attached different importance to them.

The study pursues four objectives: (1) to describe the characteristics of ERP implementation in the four companies; (2) to establish which implementation steps were executed; (3) to examine how the perceived importance of the steps relates to the benefits reported by the organization; and (4) to propose a preliminary implementation methodology that separates Organizational Preparation from Technical Development. The contribution is an exploratory, empirically informed refinement of a widely used five-stage model, a tentative theoretical explanation of why different benefit types respond differently to preparation, and a set of propositions for future testing. The findings are positioned as preliminary heuristics rather than definitive rules.

The remainder of the paper is organized as follows. Section 2 reviews the literature on implementation characteristics, stage-based models, success factors and the timing of benefits. Section 3 describes the research method. Section 4 reports the empirical results. Section 5 presents the proposed methodology, Section 6 discusses the findings and their theoretical interpretation, Section 7 sets out the limitations and directions for future research, and Section 8 concludes the paper.

LITERATURE REVIEW

Characteristics of ERP Implementation Projects

ERP projects differ in their physical, organizational and technical boundaries. Parr and Shanks (2000) classified these differences into the categories summarized in Table 1, namely physical scope, business process reengineering (BPR) scope, technical scope, module implementation strategy and resource scope. Barki et al. (2005) later refined such dimensions into measurable project variables, shown in Table 2, which allow projects of different sizes to be compared systematically.

Table 1. ERP implementation characteristics (adapted from Parr & Shanks, 2000)

Scope category	Characteristic	Variable options
Physical	Site count	Single site vs. multiple sites
	User base	Small (<100), medium (100–200), large (>200)
BPR	Implementation alignment	BPR aligned to ERP package vs. local BPR
Technical	System modification	No modification, minor modification, major modification
Module	Functional scope	Skeletal (core) vs. full functionality
	Deployment strategy	Phased (module by module) vs. big bang (all integrated at once)
Resource	Budget and time	Project budget and project duration

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Table 2. Measurement variables of ERP implementation (adapted from Barki et al., 2005)

Variable name	Measurement unit or scale
Project duration	Number of months
Project effort	Man-months
Project budget	Total cost in USD
ERP customization	Degree of code modification made to the ERP package (scale 1–10)
ERP scope (breadth)	Single site (1), multi-site in state (2), multi-state (3), international (4)
ERP depth	Total number of active ERP users
BPR magnitude (automation)	(% automated after ERP) – (% automated before ERP)
BPR magnitude (modification)	(% of processes reengineered) × (extent of modification, 1–10)
BPR scope and depth	Total number of affected employees across departments and regions

Stage-Based ERP Implementation Models

Because implementation scope varies, researchers have proposed multi-stage frameworks that integrate software technology, process workflows, user mind sets and change management (Marnewick & Labuschagne, 2005). Four models are particularly relevant to this study.

Rajagopal (2002) adapted an IT implementation model and described ERP implementation in six stages: initiation, adoption, adaptation, acceptance, routinization and infusion. Marnewick and Labuschagne (2005) conceptualized ERP as consisting of four components (the software, the process flow, change management and the customer mind set) and derived a five-stage method. In the pre-implementation stage, operational needs, business drivers and strategic plans are identified to set the scope and objectives. The analysis stage evaluates organizational baselines, including current business processes, functional and technical requirements, and workforce culture and skills. The design stage combines direction-setting information with these baselines to create a future-state design, the construction stage turns the design into operational processes and information system support, and the implementation stage prepares final deployment, culminating in go-live and a post-implementation audit of whether the ERP solution meets its goals.

Ehie and Madsen (2005) described a five-stage process that follows the structure used by major ERP vendors: project preparation, business blueprint, realization, final preparation, and go-live and support (Table 3). Finally, Zouhair and Elmrini (2026) describe the ERP implementation process as three stages, namely pre-implementation (analysis and design), implementation (realization and final preparation) and post-implementation (commissioning and support), and show, through action research in two small and medium-sized enterprises (SMEs) and a fuzzy analytic hierarchy process (AHP) analysis of consultants' judgments, that the relative importance of success factors changes from phase to phase (Table 4). In their study, strategic factors dominate the analysis phase, project management and technological factors gain weight in design and realization, and organizational factors such as user training and change management become most important in final preparation and in support after go-live. Their evidence comes from only two Moroccan SMEs, so it is used here as a complementary perspective and not as a general rule. The five-stage model in Table 3 remains the reference model used in the present study, and the three-stage grouping in Table 4 shows how its stages map onto the wider life cycle.

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Table 3. Five-stage ERP implementation process (adapted from Ehie & Madsen, 2005)

Stage	Main steps
1. Project preparation	Form the steering committee and project team; define the scope and vision; establish the project plan.
2. Business blueprint	Analyse current processes; select ERP modules; map new process designs (workflows, scripts, tables).
3. Realization	Conduct technical development (customization, interfaces, data migration); perform conference room pilots (CRP).
4. Final preparation	Perform system tuning, menu and profile configuration and robustness testing; conduct end-user training.
5. Go-live and support	Deploy ERP modules; carry out continuous system enhancement and support.

Table 4. Three-stage ERP implementation life cycle and dominant success factors (adapted from Zouhair & Elmrini, 2026)

Stage (phases)	Main activities and dominant success factors
Pre-implementation (analysis, design)	Project kick-off, structuring of the project team, analysis of existing processes and interviews with key users; design of target processes through prototypes and workshops, definition of customization rules and data migration strategy. Dominant factors: management support and involvement in analysis (23%); project management (27%) and project team competence (22%) in design.
Implementation (realization, final preparation)	Configuration of modules, customization, data migration and iterative testing; user training and user acceptance testing. Dominant factors: ERP configuration (24%) and project management (21%) in realization; user training (22%), testing (20%) and change management (18%) in final preparation.
Post-implementation (commissioning and support)	Deployment in the production environment, production audit and post-production support. Dominant factors: change management (27%) and end-user involvement (23%).

Success Factors and Organizational Readiness

A large body of research identifies the factors that make ERP projects succeed. In an early review, Nah et al. (2001) identified eleven critical factors, among them ERP teamwork and composition, a change management program and culture, top management support, a business plan and vision, business process reengineering with minimum customization, project management and effective communication, and mapped them to the phases of the ERP life cycle. More recent work confirms the importance of the organizational side. Leyh et al. (2025) derived 33 success factors and found that top management support and involvement, organizational fit of the ERP system and user training were the three most frequently identified, with most important factors being organizational and strategic factors.

Studies of manufacturing firms in Malaysia show a similar picture. Ramayah et al. (2007) found that top management involvement, business plan and vision, vendor support, change readiness, teamwork and communication were critical for successful implementation, and that organizational resistance moderated the relationship between these factors and user satisfaction. Nah et al. (2007), studying multinational manufacturers in a Malaysian free trade zone, reported that enterprise-wide communication and a project management program were the key drivers of success, with organizational culture acting as a moderator. After

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go-live, employee involvement, top management support and cultural fit were found to strengthen the relationship between ERP use and supply chain performance (Shatat & Udin, 2013).

Readiness and change management have received particular attention in small and medium-sized manufacturers. Raymond et al. (2006) proposed a readiness framework with four dimensions (organizational context, external forces, perception of ERP and business processes) and validated it in eleven manufacturing SMEs. Olsen et al. (2022) examined a Norwegian mechanical manufacturer and reported that change management was difficult mainly because customizing organizational processes ran against the established culture, risk management was underestimated and the project was not viewed holistically. Gessa et al. (2023) analysed SME customer stories and concluded that ERP supports decision quality and success, but that a short-term orientation often takes precedence over strategic and economic benefits. Finally, Salimi et al. (2006) argued that implementation differs between manufacturing and service firms, which supports the focus of the present study on manufacturers.

Benefit Dimensions and the Timing of Benefit Realization

Benefits from ERP are not a single outcome. Shang and Seddon (2002) consolidated the benefits reported for enterprise systems into five dimensions: operational, managerial, strategic, IT infrastructure and organizational. The first three reflect the operational, managerial and strategic levels of management activity, and the framework was derived from vendor-reported cases and interviews with managers in 34 organizations.

Several studies suggest that these benefit types materialize on different time scales. Seddon et al. (2010) proposed a long-term, multi-project model in which functional fit and the overcoming of organizational inertia drive organizational benefits soon after go-live, whereas integration, process optimization, improved access to information and continuing improvement projects drive benefits over the longer term. Staehr et al. (2012), who studied the post-implementation periods of four manufacturing companies, treated benefit realization as an organizational change process that unfolds over several years after go-live. Esteves (2009) argues that the dimensions of benefit realization are interconnected and should be managed as a continuing cycle during the post-implementation period, and Jurasek (2026), who followed twelve system-generated performance indicators in four industrial companies for 24 months after go-live, reports that implementation is not finished at go-live and that continuing effort in process adjustment, training and system development is needed to exploit the benefit potential.

Governance and organizational capability play a second role. Govindaraju et al. (2018) show that IT governance processes, in particular IT–business alignment and IT benefits management, influence how effectively an ERP system is operated and enhanced after implementation, and they argue that overall ERP benefits can be reached only when the operating environment supports them. At a broader level, Vial (2019), reviewing 282 works on digital transformation, describes it as a process in which organizations respond strategically to digital technologies while managing structural changes and organizational barriers, and identifies dynamic capabilities as a key research avenue. Read together, these studies suggest that benefits closer to the managerial and strategic levels depend less on the quality of the implementation project than on the governance arrangements and digital maturity of the organization that uses the system afterwards.

Research Gap

Existing studies identify what success factors and stages matter, but few compare firms that execute an identical set of stage activities and examine whether the importance they attach to individual steps is related to the benefits obtained. Fewer still separate organizational preparation from technical development when doing so. This study contributes by treating the steps of a standard five-stage model as two domains and by relating the perceived importance of each domain to five categories of organizational benefit. Moreover, the literature on benefit timing and post-implementation governance has seldom been linked to the step-level priorities set during implementation; this study offers an exploratory first look at that link.

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RESEARCH METHODOLOGY

Research Design

The study adopted an exploratory multiple-case design with two data sources. Four manufacturing companies in Malaysia, designated C1, C2, C3 and C4 to preserve confidentiality, were examined to compare real-world implementation practice and to relate the perceived importance of implementation steps to the benefits experienced. The design is observational: no variable was manipulated and no control or comparison condition was created, so the study is suited to generating hypotheses rather than testing them.

Data Collection

Data were collected using two methods. First, in-depth expert interviews were conducted with key ERP project managers and lead consultants in each company. A total of 10 managers and key consultants for each module were selected based on their expertise and experience. These interviews captured the project characteristics listed in Table 1, confirmed which implementation steps had been executed, and asked each expert to rate the importance of every step on a scale from 0 (not important) to 9 (critical). The 26 steps were organized according to the five-stage model in Table 3. Second, a structured questionnaire was distributed to active ERP users to measure the benefits perceived by the organization. 100 questionnaires was distributed and 70 was collected successfully. Benefits were assessed across five dimensions (operational, managerial, strategic, IT infrastructure and organizational) on a scale from 1 to 5. These five dimensions follow the enterprise-system benefits framework of Shang and Seddon (2002).

DATA ANALYSIS

The 26 steps were grouped into two domains. Organizational Preparation comprises the 14 steps of Stage 1 (project preparation) and Stage 2 (business blueprint). Technical Development comprises the 12 steps of Stage 3 (realization), Stage 4 (final preparation) and Stage 5 (go-live and support). For each company, the mean importance rating of each domain and the mean perceived benefit of each dimension were computed. Because only four cases are available, inferential statistics were not applied. Instead, the companies were ordered by the mean importance of each domain and the benefit scores were plotted against that ordering, so that associations could be inspected as descriptive patterns. Because the ordering rests on only four observations, it is used to describe patterns and not to estimate effects.

EMPIRICAL RESULTS

ERP Implementation Characteristics Across the Cases

The cross-case comparison revealed substantial differences in physical scale, BPR alignment, customization and deployment strategy (Table 5). In physical scope, C1 is a single-site company whereas the other three operate multiple sites (more than five in C2, 14 in C3 and eight in C4). In BPR scope, C1 and C2 aligned their business processes to the ERP package, while C3 and C4 aligned the ERP to their local processes. Customization followed the same division: C1 and C2 kept the standard configuration, C3 carried out major customization and C4 minor customization.

The most significant difference lies in the module strategy. C1 and C2 implemented full-functionality modules using a big-bang rollout, installing the whole set of modules first and then integrating them with legacy systems. C3 and C4 implemented skeletal (core) modules and rolled them out in phases, integrating one module at a time. Project timelines ranged from 6–9 months in C2 to 12–24 months in C3 and C4.

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Table 5. ERP implementation characteristics across the case companies

Scope category	Characteristic	Company C1	Company C2	Company C3	Company C4
Physical scope	Sites	Single site	>5 sites	14 sites	8 sites
	Active users	<100 users	100–200 users	>200 users	100–200 users
BPR scope	Alignment strategy	BPR aligned to ERP	BPR aligned to ERP	ERP aligned to local BPR	ERP aligned to local BPR
Technical scope	Customization level	None (standard)	None (standard)	Major customization	Minor customization
Module strategy	Module type	Full functionality	Full functionality	Skeletal / core	Skeletal / core
	Rollout method	Big bang (integrated)	Big bang (integrated)	Phased (module by module)	Phased (module by module)
Resource scope	Timeline	9–12 months	6–9 months	12–24 months	12–24 months

Implementation Steps Executed

Although the characteristics of the four projects differ, all four companies carried out the same implementation activities. These activities fit the five-stage model in Table 3, so each step belongs to a category and each category to a stage, as summarized in Figure 1.

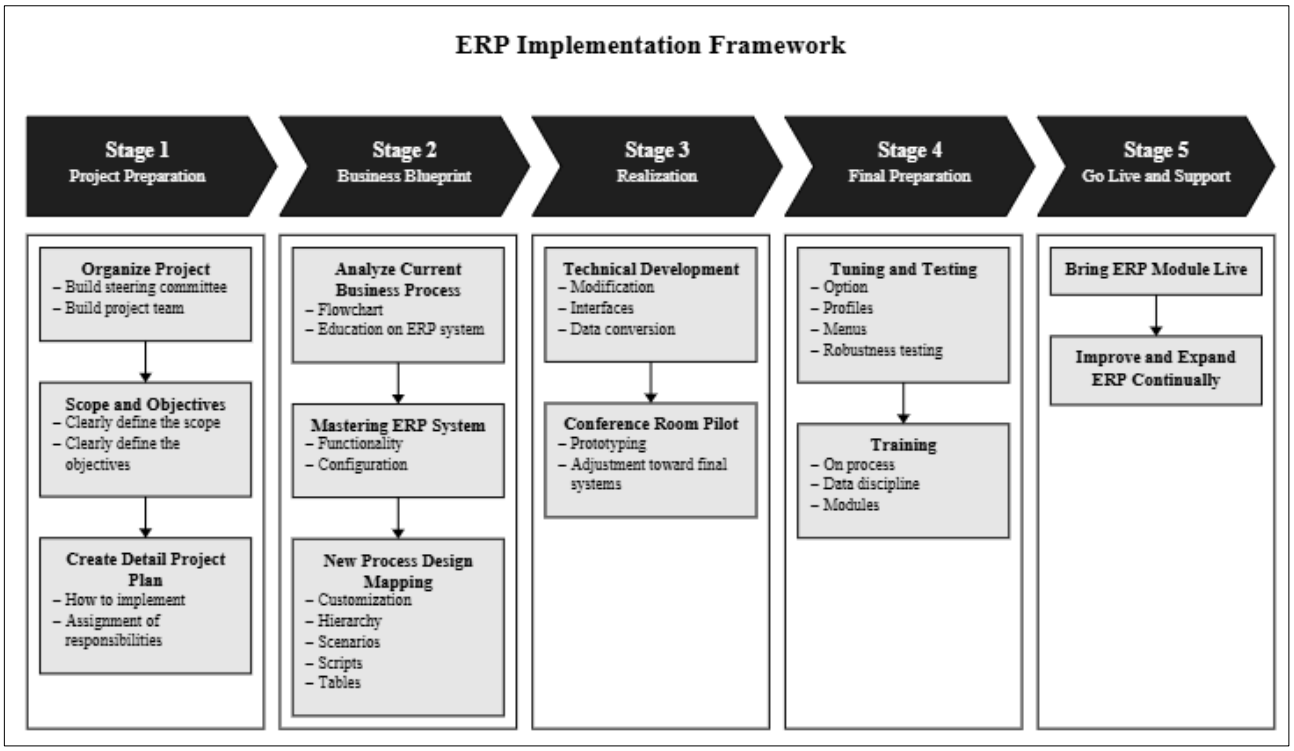


Figure 1. ERP implementation steps carried out in the studied companies

Perceived Importance of the Implementation Steps

Although every step was executed, the experts' views on how important each step was differed markedly (Table 6). C2 rated every step 9 except robustness testing (8). C3 rated all steps within a narrow band between 6 and 8, with the lowest score given to educating people on the ERP system. C1 used the range between 6 and

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9, assigning its lowest score to business process reengineering and its highest scores to process analysis, process flowcharting, preparing people, new process mapping, the three testing and tuning steps and training on ERP modules. C4 showed the widest spread (5 to 9): it gave a score of 9 to the steering committee, objectives, implementation approach, process analysis, preparing people and go-live, but only 5 to ERP prototyping and training on data discipline.

Table 6. Perceived importance ratings for implementation steps (scale 0–9)

Stage	Sub-activity	Step	C1	C2	C3	C4
Project preparation	Organize project	Build steering committee	8	9	7	9
		Build project team	8	9	8	7
	Define scope	Create detailed scope	8	9	8	8
		Define clear objectives	8	9	8	9
	Create detailed project plan	How to implement	8	9	7	9
		Assignment of responsibilities	8	9	7	6
Business blueprint	Analyze current business process	Analysis of business process before selecting ERP system	9	9	7	9
		Create business process flowchart	9	9	7	7
		Educate people on ERP system	8	9	6	8
	Master ERP system	ERP system selection process	7	9	7	8
		Prepare people in mastering ERP functionality and configuration	9	9	7	9
	New process design mapping	Business process alignment to match the ERP package	8	9	7	7
		Business process reengineering	6	9	7	7
		New business process mapping (customization, hierarchy, scenarios, scripts, tables)	9	9	7	7
Realization	Technical development	Develop the ERP (modification, interfaces, data conversion)	7	9	7	8
	Conference room pilot	ERP prototyping	7	9	7	5
		Adjustment toward final system	7	9	7	8
Final preparation	Tuning and testing	Testing and tuning of ERP processing options	9	9	8	8
		Testing and tuning of ERP profiles	9	9	8	8
		Testing and tuning of ERP menus	9	9	8	8
		Robustness testing	8	8	8	8
	Training	Training on ERP process	8	9	8	8
		Training on data discipline	7	9	8	5
		Training on ERP modules	9	9	8	7
Go-live and support	Bring ERP module live	Execute system go-live	8	9	8	9
	ERP improvement	Improve and expand ERP continually	8	9	8	7

Benefits Obtained from ERP Implementation

The companies obtained different levels of benefit (Figure 2 and Table 7). C2 reported the highest benefit in every dimension, with a maximum score of 5.00 for operational, managerial, IT infrastructure and organizational benefit and 4.42 for strategic benefit. C1, C3 and C4 reported scores between 3.31 and 4.25. The companies generally reported only minor alignment problems that caused minor inconvenience or downtime.

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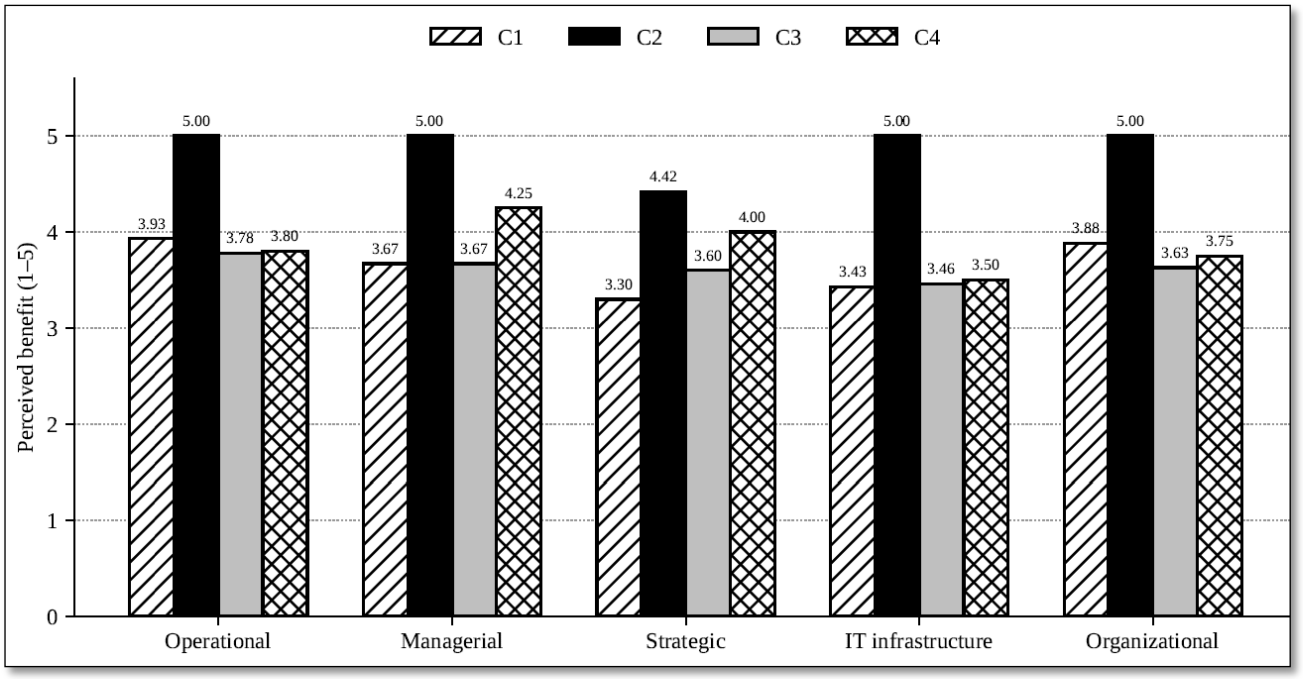


Figure 2. Perceived benefits of ERP implementation by company

Relationship between Perceived Importance and Benefits

Earlier studies conclude that organizational fit is central to ERP success (Leyh et al., 2025; Raymond et al., 2006). For this reason, the organization-related steps (Stages 1 and 2) were separated from the technical steps (Stages 3 to 5) when relating importance to benefits. Organizational Preparation covers building the steering committee and project team, defining scope and objectives, planning the implementation, assigning responsibilities, analyzing and flowcharting current business processes, educating and preparing people, selecting the ERP system, aligning and reengineering processes and mapping the new processes. Technical Development covers developing the ERP, prototyping and adjustment, testing and tuning, robustness testing, the three training activities, go-live and continual improvement. Table 7 reports the mean importance of each domain together with the mean benefit scores.

Table 7. Perceived importance of each domain versus perceived benefit scores (benefit scale 1–5)

Company	Mean importance of steps (0–9)		Benefit from implementing ERP (1–5)				
	Organizational preparation	Technical development	Operational	Managerial	Strategic	IT infrastructure	Organizational
C2	9.00	8.92	5.00	5.00	4.42	5.00	5.00
C1	8.07	8.00	3.93	3.67	3.31	3.44	3.89
C4	7.86	7.42	3.80	4.25	4.00	3.50	3.75
C3	7.14	7.75	3.78	3.67	3.61	3.46	3.64

Because the sample is small and the design is uncontrolled, no correlation or significance testing was attempted; the relationships were examined from the plotted trends and are reported as tentative associations.

Organizational preparation versus benefits. Figure 3 plots each benefit dimension against the mean importance given to organizational preparation, with companies ordered from lowest (C3) to highest (C2). As the importance of organizational preparation increases, operational and organizational benefits rise consistently. Managerial, strategic and IT infrastructure benefits rise in some companies but fall in others. Thus, there is a tendency for operational and organizational benefits to increase with the importance attached to organizational preparation, whereas the relationship with the other three dimensions is doubtful.

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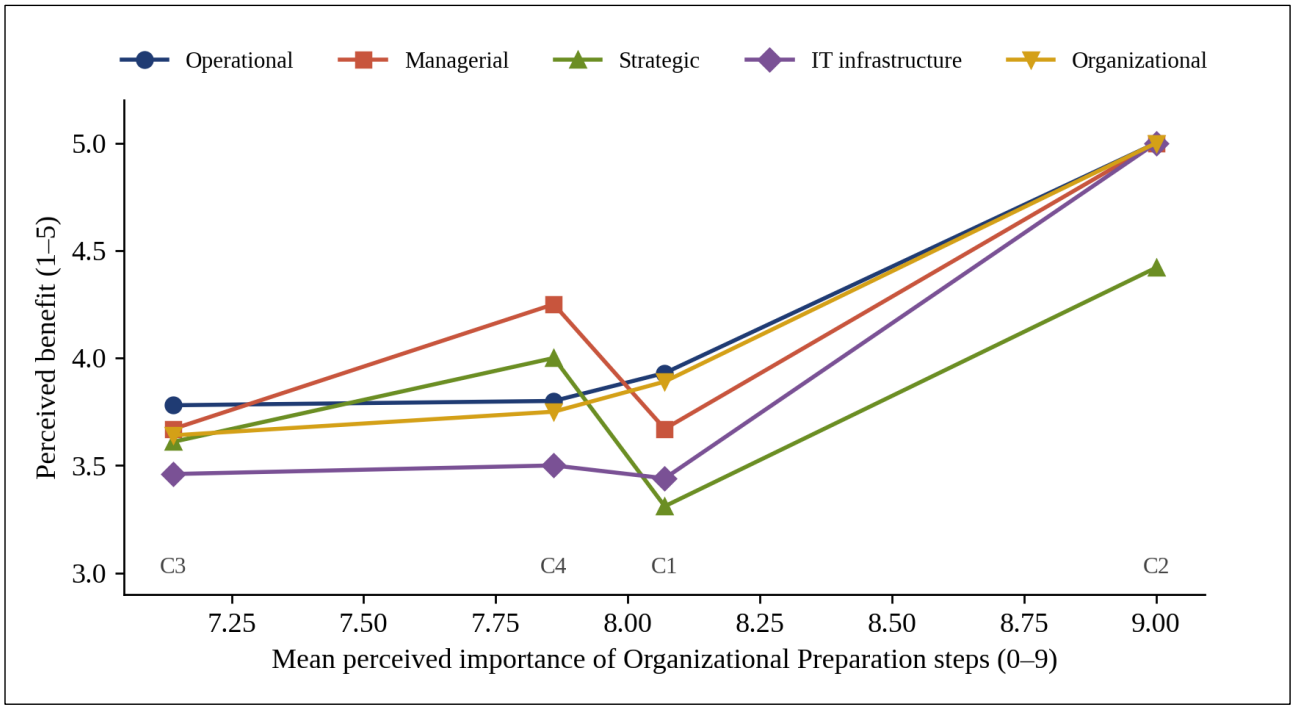


Figure 3. Organizational preparation versus ERP benefits

Technical development versus benefits. Figure 4 shows the same comparison for technical development. As the importance of technical development increases, operational benefit rises broadly (apart from a negligible difference between C4 and C3), whereas organizational, managerial, strategic and IT infrastructure benefits rise in some companies and fall in others.

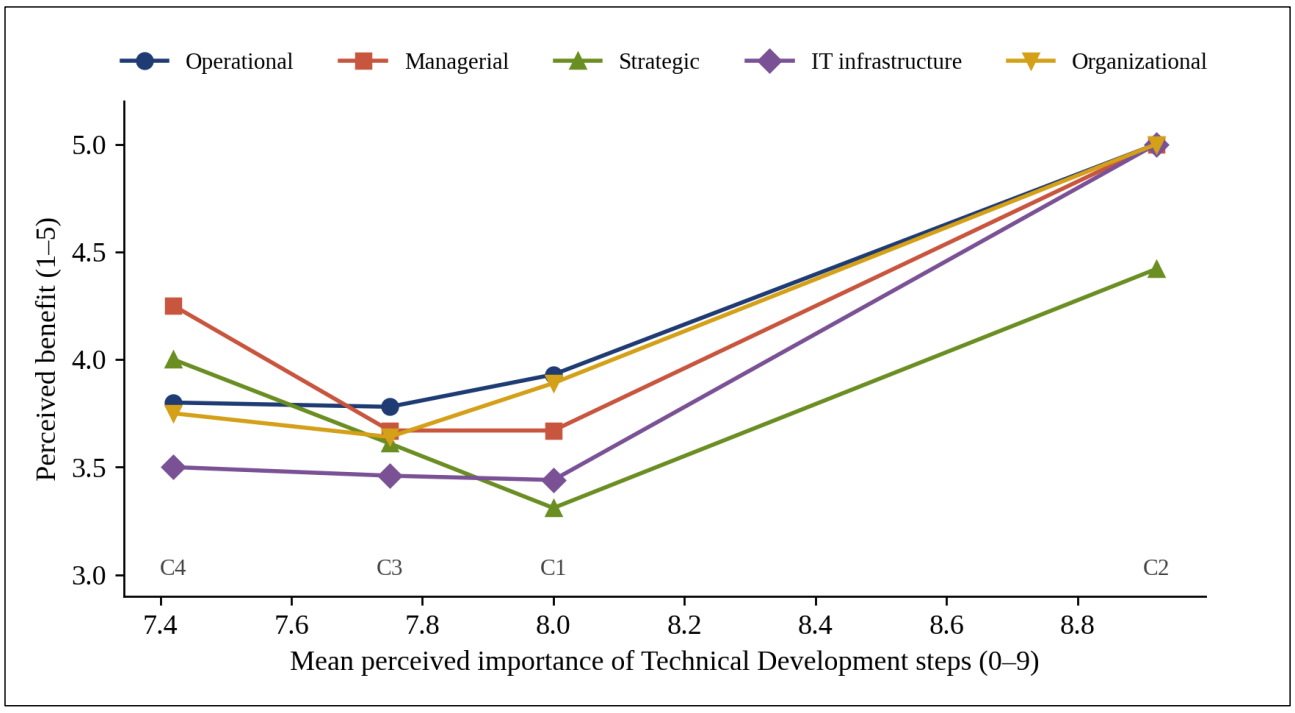


Figure 4. Technical development versus ERP benefits

Three tentative observations follow from these comparisons. They describe patterns in four cases and should not be read as causal effects:

(a) Organizational readiness tends to accompany core performance. Higher perceived importance of organizational preparation tended to accompany higher operational and organizational benefits. Companies that gave priority to business process analysis and to scoping and planning reported more favorable outcomes.

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(b) Technical development tends to accompany operational performance. High importance placed on technical development tended to accompany operational benefit, but its relation to managerial or strategic benefit is inconsistent.

(c) Managerial, strategic and IT infrastructure benefits show no consistent pattern. These broader benefits may depend on conditions outside the scope of this study, such as post-implementation governance and digital maturity (Section 6.2).

PROPOSED ERP IMPLEMENTATION METHODOLOGY (PRELIMINARY)

Because implementation scope and the perceived priority of steps vary between organizations, ERP projects may produce inconsistent results even when they follow the same methodology. The results in Table 7 suggest that the divergence in reported benefits is associated not with which steps were executed but with how strongly each domain was prioritized. Organizational preparation tended to accompany both organizational and operational benefits, whereas technical development accompanied operational benefit only. Other benefit dimensions showed no consistent relationship with either domain, which suggests that they are influenced by factors beyond the scope of this study. The method proposed below is therefore a preliminary heuristic derived from four cases.

To reflect these differences, the study proposes a structural refinement of the five-stage model. The revised methodology separates the implementation activities into two sequential domains. Organizational Preparation is the foundation: it aligns readiness, culture and processes with the incoming ERP architecture. Technical Development is the execution domain: it covers the technical deployment, which may deliver its full operational efficiency only where a prepared organizational foundation exists. Making organizational preparation an explicit prerequisite is proposed as a hypothesis for validation rather than a proven rule (Figure 5). The sequence does not mean that organizational attention stops at the boundary between the two domains: user training, change management and end-user involvement remain important during final preparation and after go-live (Zouhair & Elmrini, 2026), so the sequence signifies that the organizational foundation is completed first, not that organizational work ends.

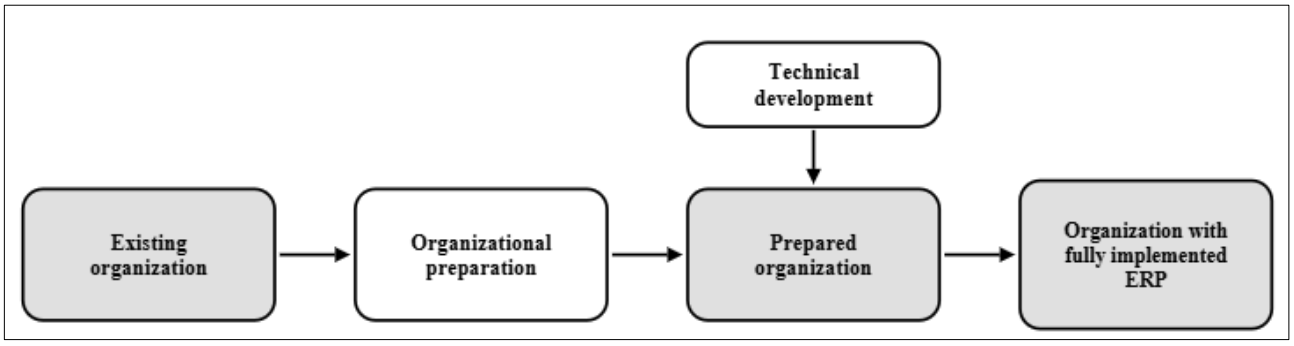


Figure 5. Proposed ERP implementation process

The activities of the proposed method are adapted from the five-stage model of Ehie and Madsen (2005). Organizational Preparation comprises two stages. Project Preparation establishes governance, defines the project vision and scope, sets performance measures and creates a detailed project plan. Business Blueprint analyzes existing business processes, selects and masters the ERP platform and maps the optimized target processes. Technical Development then comprises three stages. Realization covers system configuration, custom development and conference room pilots. Final Preparation covers system testing, performance tuning and end-user training. Go-Live and Support covers module deployment, post-go-live support and continual enhancement. The dependencies between these stages are shown in Figure 6.

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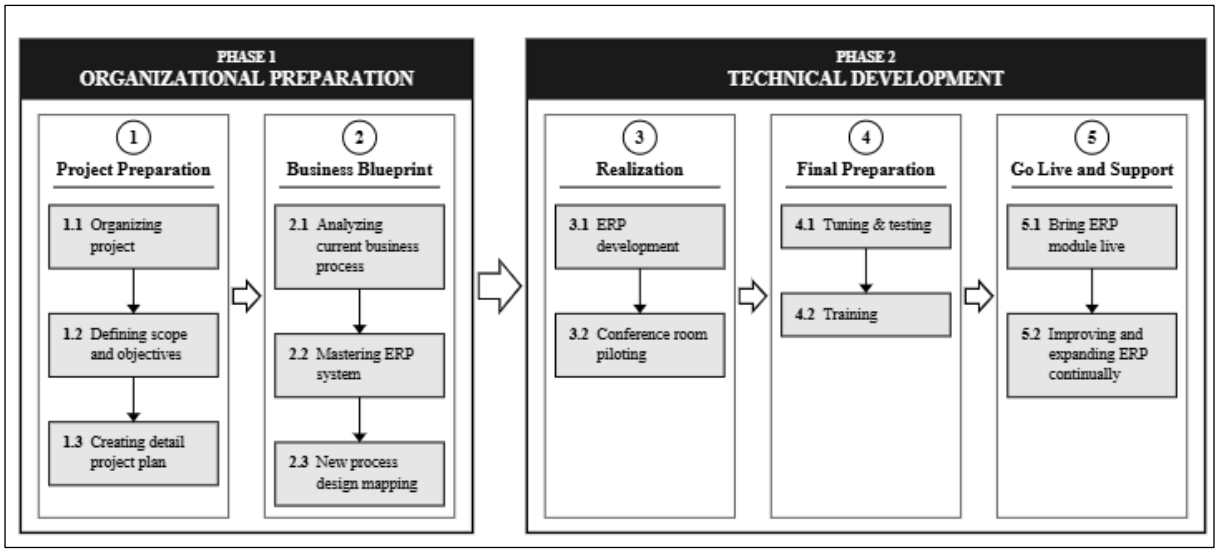


Figure 6. Proposed ERP implementation activities

Figure 6 positions organizational preparation as a prerequisite for technical development. The five phases of the proposed method are:

a) Organizational Preparation. Phase 1, Project Preparation: establish formal project governance, define a comprehensive deployment plan and set baseline key performance indicators. Phase 2, Business Blueprinting: map existing business workflows, evaluate the capabilities of the target software and formalize the future-state business process design.

b) Technical Development. Phase 3, Realization: configure the system, develop custom interfaces and validate prototypes iteratively through conference room pilots. Phase 4, Final Preparation: carry out end-to-end integration and stress testing, full-scale data migration and targeted end-user training. Phase 5, Go-Live and Continuous Support: execute the production cutover, transfer operations to maintenance, optimize system performance continuously and expand module adoption step by step.

The step-by-step execution pathway of these phases is illustrated in Figure 7.

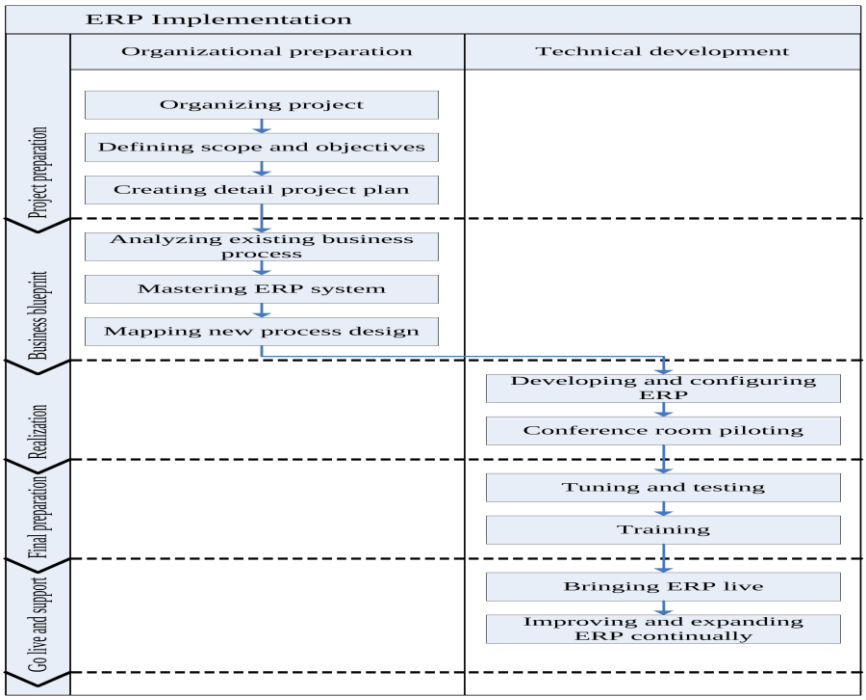


Figure 7. Proposed ERP implementation steps

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DISCUSSION

Interpreting the Findings: Exploratory Heuristics, Not Definitive Rules

The findings suggest that procedural uniformity does not guarantee uniform outcomes. All four companies executed the same set of activities, in line with the five-stage model of Ehie and Madsen (2005), even though the experts did not refer to the framework by name. Yet the reported benefits differed, and the differences accompany the priority given to each step: activities regarded as critical by the company with the highest benefits were frequently treated as secondary elsewhere. This is consistent with the argument that ERP outcomes may depend less on the presence of a methodology than on how the organization commits itself to it.

These observations must be read within the limits of the design. The study is observational: no condition was manipulated, no control or comparison group was formed, and the four companies differ in many respects other than the priority they gave to preparation, including size, number of sites, customization, rollout strategy, project duration, ERP package and the time elapsed since go-live. For example, C1 and C2 both kept a standard configuration and used a full-module big-bang rollout, so their favourable scores may reflect these project characteristics as much as the importance they attached to preparation. The direction of influence is also uncertain, because companies that were satisfied with their results may retrospectively judge the preparatory steps to have been important. C2, which gave the highest importance ratings and reported the highest benefits, exerts a strong influence on the plotted trends, and its scores lie close to the ceiling of both scales. For these reasons the prioritization pattern is not presented as a cause-and-effect relationship or as a definitive rule. It is better understood as a preliminary, exploratory heuristic: a plausible rule of thumb for planning and a source of hypotheses that later controlled studies can test.

6.2 Why operational and organizational benefits respond to preparation while managerial and strategic benefits do not

A theoretically grounded reading of the pattern starts from the distinction between proximal and distal benefits. Operational benefits arise when routine transactions run on the new system, and organizational benefits arise when people, roles and work practices adapt to it. Both are largely determined at the point where the system meets the organization. Seddon et al. (2010) identify functional fit and the overcoming of organizational inertia as the factors that drive benefits soon after go-live, and these are precisely the concerns of the activities in Organizational Preparation: analysing and mapping processes, aligning them with the package, educating and preparing people, and securing governance and scope. Technical development also contributes to operational benefit because a configured, tested and well-trained deployment is a precondition for stable daily operation. It is therefore plausible that benefits at this proximal level respond readily to the effort invested before and around go-live.

Managerial and strategic benefits are more distal. In the framework of Shang and Seddon (2002) they correspond to the managerial and strategic levels of activity, where value comes from better monitoring, planning and decision making and from changes in competitive position rather than directly from running transactions. Such benefits depend on conditions that develop after go-live. Seddon et al. (2010) point to integration, process optimization, improved access to information and continuing improvement projects as the drivers of longer-term benefits, and Staehr et al. (2012) show that benefits in manufacturing firms emerge over several years as an organizational change process. Post-implementation governance is central to this process: Govindaraju et al. (2018) report that IT–business alignment and IT benefits management shape the effectiveness of ERP operation and enhancement, and Esteves (2009) argues that benefit realization is a continuing cycle that has to be actively managed. A project that is carefully prepared but followed by weak governance may therefore realize operational gains without managerial or strategic ones, while the reverse combination is also conceivable. This would explain why these dimensions look stagnant or volatile across the four companies. IT infrastructure benefits may, in addition, be shaped more by architectural and vendor decisions than by organizational preparation.

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Digital maturity offers a complementary explanation. Following Vial (2019), digital change succeeds when organizations manage structural changes and organizational barriers and build the dynamic capabilities needed to respond strategically to technology. Here digital maturity is understood as the organization's capability to absorb and sustain digital change over time. A mature organization can convert the information that ERP provides into better managerial control and strategic positioning, whereas a less mature organization may remain at the level of transaction efficiency, a pattern that matches the short-term orientation reported by Gessa et al. (2023). Timing is a further source of volatility. Jurasek (2026) found that performance indicators change over the 24 months after go-live, and the four companies may have been assessed at different points on this trajectory. Because time since go-live was not controlled in this study, part of the variation in managerial, strategic and IT infrastructure scores may reflect differences in timing rather than differences in preparation.

These arguments are offered as propositions for future testing, not as findings. P1: the association between organizational preparation and benefits is stronger for operational and organizational benefits measured soon after go-live than for managerial and strategic benefits. P2: the association between preparation and managerial and strategic benefits is strengthened by the quality of post-implementation governance and by the digital maturity of the organization. P3: managerial and strategic benefits increase with time since go-live more than operational benefits do.

Relationship to the Wider Literature

The association between the importance of organizational preparation and the operational and organizational benefits is consistent with the wider literature. Leyh et al. (2025) found that organizational fit, top management support and user training are the leading success factors, and Nah et al. (2001) and Ramayah et al. (2007) emphasized change management, business plans and vision, teamwork and communication. The readiness dimensions proposed by Raymond et al. (2006), and the difficulties reported by Olsen et al. (2022) when process changes conflicted with company culture, suggest why steps such as analyzing current processes, preparing people and mapping new processes may matter for organizational and operational outcomes: they determine whether the organization can absorb the technical solution. Table 8 summarizes the relationship between the two domains and the benefits.

Table 8. Implementation domains and associated benefits

Implementation domain	Scope of activities	Associated benefit categories
Organizational Preparation	Establishes strategic alignment, process design and governance readiness.	Organizational and operational benefits
Technical Development	Governs software configuration, data integration, system testing, training and deployment.	Operational benefit

The inconsistent pattern for managerial, strategic and IT infrastructure benefits is likewise consistent with earlier findings. Gessa et al. (2023) observed that a short-term, operational view tends to take precedence over strategic and economic benefits in the firms they studied, and Leyh et al. (2025) highlight that strategic outcomes depend on top management involvement and organizational conditions that extend beyond the implementation steps themselves. Strategic benefits are therefore likely to require sustained governance after go-live rather than only careful execution of the project, as argued in Section 6.2.

The phase-based evidence of Zouhair and Elmrini (2026) adds a useful nuance. In their Moroccan SME cases, strategic factors such as management support and process reengineering dominated the analysis phase, which corresponds to the early foundation that this study calls Organizational Preparation. At the same time, organizational factors such as user training, change management and end-user involvement became most important in final preparation and in support after go-live. Read alongside the present findings, this suggests that organizational work occurs in two waves: a foundation built before technical development and a

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continuing layer of support during and after it. The proposed heuristic captures the first wave, and the second wave is a refinement that future studies could test. Because their evidence rests on two SMEs and consultants' judgments, it should be treated as indicative and not as confirmation.

Implications for Practice and Research

For managers, the proposed two-domain structure offers two potential advantages, presented here as a heuristic to be tested in practice. First, it allows the organization to assess and plan strategic and cultural readiness separately from technical readiness instead of applying one blanket assessment to the entire rollout. Second, it makes the sequencing explicit: it may be prudent to begin technical work only once the organizational foundations, namely governance, scope, process understanding and people preparation, are in place, and to plan post-implementation governance and benefits management from the start so that managerial and strategic benefits are not left to chance. For researchers in the social sciences, the results illustrate that ERP implementation is a socio-technical change process in which organizational and behavioral factors accompany the outcomes managers care about most, and the propositions in Section 6.2 offer a starting point for testing that relationship.

Limitations and Future Research

Limitations

Design and causal inference. The study is exploratory and based on four cases with no experimental control, no random assignment and no comparison condition. Inferential statistics could not be applied, so the associations are descriptive and cannot establish that prioritizing organizational preparation causes higher benefits. Confounding factors, including company size, number of sites, customization, rollout strategy, project duration, ERP package and time since go-live, were not controlled. C2 has a strong influence on the plotted trends, and C1 and C2 share a standard configuration with a full-module big-bang rollout, so the effect of prioritization cannot be separated from the effect of project characteristics.

Single-source perceptual bias. Both constructs rest on perceptions gathered from within the participating organizations. The importance of each step was given as one consolidated rating per company, and the benefits were self-reported by users who work in the same organizational context. Such single-source perceptual data are exposed to common method bias, including consistency motives, halo effects, social desirability and retrospective rationalization (Podsakoff et al., 2003). In particular, respondents who judge the implementation to have been successful may recall the preparatory steps as more important than they were at the time, which would inflate any association between importance and benefit. If ratings were given with knowledge of how the project turned out, they reflect remembered rather than recorded priorities, and in either case the perceived benefits were not verified against operational records.

Measurement, timing and generalizability. The 0–9 importance scale and the 1–5 benefit scale were not psychometrically validated, the steps were weighted equally within each domain, and the scores of C2 lie close to the ceiling of both scales, which limits discrimination between companies. The data are cross-sectional, whereas benefits evolve over several years after go-live (Esteves, 2009; Seddon et al., 2010; Staehr et al., 2012) and the time elapsed since go-live was not controlled. The moderating conditions discussed in Section 6.2, namely post-implementation governance and digital maturity, were not measured. Finally, four companies cannot represent the variety of ERP packages, industries and national contexts, so the findings should not be generalized.

FUTURE RESEARCH

Objective performance metrics. Future studies should replace perceptions with objective evidence. Operational benefits could be measured with indicators extracted directly from the ERP system and related records, such as production order cycle time, cost deviation, stock turnover, customer order lead time, delivery reliability, the duration of the monthly financial close, the number of IT support tickets and system usage,

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following the longitudinal approach of Jurasek (2026), who tracked twelve such indicators over 24 months after go-live. Managerial and strategic benefits could be assessed through documented changes in decision processes, planning cycles or market-related outcomes, combined with multi-informant ratings from senior management, users and IT staff to reduce single-source bias.

Larger samples and stronger designs. The propositions in Section 6.2 should be tested with a sufficiently large number of manufacturing firms, with the sample size justified by a power analysis. Regression-based or structural equation modeling could then control for firm size, customization, rollout strategy, ERP package and time since go-live, and could test the moderating roles of post-implementation governance and digital maturity. Repeated measurements at fixed intervals after go-live would show how benefit profiles evolve. Procedural remedies for common method bias, such as collecting predictor and outcome data from separate sources and guaranteeing respondent anonymity, should be built into the design (Podsakoff et al., 2003).

Testing the heuristic directly. Where feasible, quasi-experimental or action-research designs could compare projects, or rollout waves within one firm, that apply a formal organizational-readiness gate before technical development with comparable projects that do not, using the same objective indicators. Studies could also examine how cloud-based ERP and AI-driven automation change the activities required in the Organizational Preparation domain, and whether a parallel organizational-support track of training, change management and end-user involvement during Technical Development adds to the effect of upfront preparation (Zouhair & Elmrini, 2026).

CONCLUSION

This exploratory study examined ERP implementation in four manufacturing companies that differed in scale, BPR alignment, customization, module strategy and timeline but carried out the same implementation activities. Differences in the reported benefits accompanied the importance the companies attached to the steps rather than the steps themselves. Higher importance attached to organizational preparation tended to accompany higher operational and organizational benefits, whereas managerial, strategic and IT infrastructure benefits showed no consistent pattern, which the paper explains tentatively through the time lag of benefit realization, post-implementation governance and digital maturity. On this basis, the study proposes, as a preliminary heuristic rather than a definitive rule, dividing implementation into two domains: Organizational Preparation, which comprises the readiness activities aimed at aligning workflows and culture with the ERP platform, ahead of Technical Development, which comprises configuration, integration, testing, training and deployment. Because the evidence is observational, perceptual and limited to four cases, the contribution lies in generating testable propositions and a practical planning aid that future quantitative studies, using objective performance metrics and larger samples, can confirm, refine or reject.

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