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The Contribution of Information Systems to Rationalizing Investment Decisions in Construction and Real Estate Projects: A Case Study of Algerian Construction, Public Works, and Real Estate Firms (2000–2016)

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Abstract---This paper investigates the contribution of information systems to rationalizing investment decisions in construction and real-estate projects, focusing on Algerian enterprises operating in the construction, public-works, and real-estate sectors between 2000 and 2016. Information systems have become indispensable instruments for modern organizations, enabling accurate data processing, risk assessment, and evidence-based decision-making. Despite the growing importance of digital transformation, the integration of information systems into strategic investment processes remains limited across many developing economies. Using a mixed theoretical–empirical design, the study employs a descriptive–analytical methodology and analyzes data collected through a structured questionnaire distributed to 30 firms. Statistical analysis using XLSTAT reveals that, although most firms possess adequate technological infrastructure (mean = 3.38), the effective use of information systems in investment-decision rationalization remains moderate (mean = 2.88). The findings highlight a transitional stage in which firms are aware of the importance of digitalization but have not yet achieved comprehensive integration between technological resources and managerial decision-making. The paper contributes to the literature on information-system effectiveness in emerging economies and offers practical recommendations for strengthening digital governance, enhancing decision quality, and improving the alignment between technological and strategic planning.

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1. Introduction

The past two decades have witnessed profound structural transformations in the global economy, driven by the exponential diffusion of information and communication technologies (ICT). These transformations have reshaped production systems, organizational structures, and decision-making processes, ushering in what many scholars describe as the information economy. Within this evolving landscape, information has become both a strategic asset and a production factor comparable to capital or labor (Laudon & Laudon, 2022).

In this context, information systems (IS) occupy a pivotal role. They enable organizations to collect, process, and analyze data from internal and external environments, thereby facilitating informed decision-making, improving coordination, and supporting strategic planning. The integration of IS into managerial functions enhances competitiveness, reduces uncertainty, and increases the efficiency of resource allocation (Turban et al., 2018).

Among the various organizational domains affected by IS adoption, investment decision-making—particularly in construction and real-estate projects—stands out for its complexity and long-term implications. Investment choices in these sectors often involve large capital commitments, long payback periods, and multiple sources of uncertainty, including market volatility, policy changes, and environmental constraints (Elbeltagi et al., 2005). Rational decision-making under such conditions requires timely, reliable, and comprehensive information. Information systems thus represent a critical component of effective investment governance.

In Algeria, the construction and public-works sector constitutes one of the country's most dynamic and strategic industries, contributing substantially to GDP growth and employment. Yet, despite ongoing digitalization initiatives, many Algerian firms continue to rely on fragmented or semi-manual information flows when evaluating investment opportunities. This limitation hampers project selection, increases risks, and restricts long-term planning.

Against this background, the present study seeks to examine empirically how information systems contribute to rationalizing investment decisions in Algerian construction and real-estate enterprises during 2000–2016. By combining theoretical reflection and statistical analysis, the paper aims to identify the extent to which technological infrastructures and organizational practices support rational decision-making in capital-intensive projects.
The study's central research question can be articulated as follows:
To what extent do information systems contribute to the rationalization of investment decisions in Algerian construction and real-estate projects?
From this guiding question arise three subordinate objectives:

1. To assess the level of development and use of information systems within Algerian construction and public-works enterprises.
2. To evaluate the relationship between IS integration and the rationalization of investment decisions.
3. To identify the main obstacles preventing effective utilization of information systems in project selection and management.

By addressing these objectives, the study aims to enrich both theoretical and empirical understanding of IS adoption in emerging-economy contexts and to provide evidence-based recommendations for improving decision-making efficiency in Algeria's construction sector.

2. Literature Review

2.1. The Role of Information Systems in Organizational Decision-Making

The growing interdependence between technology and management has transformed the way organizations generate, process, and use information. Information systems (IS) are no longer auxiliary tools but core elements in the strategic architecture of firms (Laudon & Laudon, 2022). They provide decision-makers with structured, real-time data that support operational efficiency and strategic insight, thus reducing uncertainty and improving rationality in decision-making (O'Brien & Marakas, 2011).

Early studies, such as those by Simon (1977) and Keen (1980), established the theoretical link between information, bounded rationality, and decision-making efficiency. As information became more abundant and technology more advanced, organizations began integrating IS across hierarchical levels to transform raw data into actionable knowledge. Brynjolfsson and Hitt (2000) further demonstrated that investments in IS correlate positively with productivity and long-term performance, especially when accompanied by complementary organizational reforms.

Subsequent research emphasizes the multidimensional function of IS—encompassing data management, decision support, and strategic control (Turban et al., 2018; Stair & Reynolds, 2021). In both developed and developing economies, IS facilitate coordination, forecasting, and performance monitoring. Yet, their impact depends on managerial culture, user competence, and the alignment between technological capabilities and institutional objectives (Al-Mamary et al., 2014).

2.2. Information Systems and Rationalization of Investment Decisions

Investment decisions represent some of the most critical and irreversible choices in business management. They determine how resources are allocated and influence firms' capacity to sustain growth and competitiveness. Rational decision-making in investments requires the systematic evaluation of alternatives, risks, and expected returns (Porter & Heppelmann, 2014). Information systems, by supplying comprehensive and timely data, play a central role in ensuring that such evaluations are objective, data-driven, and strategically sound.

Empirical evidence from various contexts supports this relationship. In the construction industry, Elbeltagi et al. (2005) found that the adoption of IS enhances transparency, cost estimation accuracy, and project coordination. Similarly, Abd Rahman and Hashim (2011) showed that public-sector organizations that use integrated information systems demonstrate greater efficiency in resource allocation and project control. Within emerging economies, however, the contribution of IS to investment decisions often remains constrained by limited digital infrastructure, insufficient training, and fragmented data systems (Marghni, 2014; Charef, 2015).

From an economic perspective, the use of IS improves allocative efficiency by reducing information asymmetry between managers, investors, and policymakers. It enhances the consistency of evaluation criteria and supports long-term strategic planning. Several authors, including Laudon and Traver (2022), argue that IS create value not merely by automating processes but by generating intelligence—insightful analyses that guide investment and policy decisions. This shift from data processing to knowledge creation constitutes the foundation of what has been called the knowledge economy.

2.3. Information Systems in the Construction and Real-Estate Sector

The construction and real-estate industries are characterized by capital intensity, multi-stakeholder coordination, and exposure to economic and environmental risks. According to Turban et al. (2018), these sectors require information systems capable of integrating technical, financial, and managerial data to improve project feasibility analysis and performance monitoring. Information systems support decision-making across project life cycles—ranging from design and cost estimation to procurement, scheduling, and maintenance.

In Algeria, the modernization of construction and public-works firms has been a central objective of the national economic strategy since the early 2000s. Several studies have examined the limited adoption of digital systems and its impact on decision quality. Marghni (2014) found that most Algerian enterprises rely on partial or manual data systems, resulting in delays and inefficiencies in investment evaluation. Benabdelkader (2013) and Bouguerra (2016) similarly observed that the absence of integrated databases and specialized IS departments hinders timely access to critical information for project assessment.

International literature confirms that the benefits of IS in construction depend heavily on organizational maturity and institutional readiness. Al-Mamary et al. (2014) identified four success factors for effective IS utilization: top management support, user training, clear objectives, and continuous system updating. Without these, IS remain underutilized despite existing hardware or software infrastructure. This pattern aligns closely with the situation of Algerian firms revealed by the present study's empirical findings.

2.4. Gaps in the Existing Literature

Although numerous studies affirm the importance of IS in managerial efficiency, relatively few have addressed their specific role in rationalizing investment decisions in developing economies, particularly within the construction and real-estate sectors. Much of the global research focuses on industrialized countries, where digital infrastructure and institutional capacities are more advanced. By contrast, empirical studies in the MENA region—and Algeria in particular—remain limited in scope and often descriptive rather than analytical.

This study seeks to bridge that gap by combining theoretical and empirical perspectives to assess how Algerian construction and real-estate firms use IS to enhance the rationality of investment decisions. It contributes to the literature by contextualizing IS adoption within an emerging-economy framework, identifying structural barriers, and offering policy-oriented recommendations to strengthen digital integration in capital-intensive industries.

The reviewed literature underscores that effective information systems enhance decision quality, investment efficiency, and organizational learning. However, the degree of impact depends on three interacting factors: (1) the sophistication of technological infrastructure, (2) the organizational culture surrounding information use, and (3) the human competencies required to operate and interpret information flows. These insights provide the conceptual basis for the theoretical framework and hypotheses developed in the next section.

3. Theoretical Framework and Hypotheses Development

3.1. Conceptual Foundations

Information systems play a strategic role in the functioning and competitiveness of modern organizations. The theoretical foundations that explain their contribution to decision-making and investment rationalization can be drawn from Decision Theory, Information Economics, and the Resource-Based View (RBV) of the firm.

a) Decision Theory

Decision theory postulates that rational decision-making requires complete, accurate, and timely information (Simon, 1977). However, in real-world contexts, decision-makers operate under *bounded rationality*, constrained by limited information, cognitive capacity, and time. Information systems mitigate these constraints by providing structured data, analytical models, and feedback mechanisms that expand decision-makers' ability to evaluate alternatives objectively (Keen, 1980; Turban et al., 2018).

Hence, in environments like the construction sector—where investment choices are complex and risk-

laden—information systems serve as an instrument to enhance rationality by reducing uncertainty and improving the quality of evaluation.

b) Information Economics

Information economics highlights the role of information asymmetry and its effects on efficiency (Stiglitz, 2002). In investment decisions, asymmetric information between project managers, investors, and external stakeholders often leads to inefficiencies, misallocation of capital, and adverse selection. Information systems reduce such asymmetries by ensuring transparency, data consistency, and traceability throughout the decision process (Brynjolfsson & Hitt, 2000; Porter & Heppelmann, 2014). When construction and real-estate enterprises employ integrated IS, they improve allocative efficiency by providing decision-makers with comparable data on costs, risks, and expected returns.

c) Resource-Based View (RBV)

The RBV (Barney, 1991) posits that sustainable competitive advantage arises from valuable, rare, inimitable, and non-substitutable resources. In the digital economy, **information and knowledge** constitute such strategic resources. Effective IS enable firms to convert raw data into actionable intelligence, a process that strengthens innovation and decision quality (Laudon & Laudon, 2022). Thus, for Algerian construction and public-works firms, building a strong IS infrastructure and skilled human capital can be seen as a means of achieving organizational resilience and investment performance.

3.2. Conceptual Model of the Study

Based on these theoretical foundations, the study proposes a model where information systems influence the rationalization of investment decisions through two main pathways:

1. Technical dimension – The quality, reliability, and timeliness of data provided by IS enhance the objectivity of investment evaluations.
2. Organizational dimension – The integration of IS into managerial structures fosters analytical decision-making and reduces subjective or politically driven investment choices.

These two dimensions jointly determine how effectively IS contribute to rational and evidence-based investment decisions, particularly in construction and real-estate projects that involve long-term capital commitments.

3.3. Hypotheses Development

Drawing upon the theoretical framework and prior empirical findings (Elbeltagi et al., 2005; Abd Rahman & Hashim, 2011; Marghni, 2014; Bouguerra, 2016), the study formulates three hypotheses:

H1: Information Availability Hypothesis

The availability, quality, and timeliness of information in Algerian construction and public-works firms are insufficient to support rational investment decisions.

This hypothesis tests the extent to which information flow within organizations is comprehensive and up to date. According to decision theory, limited access to accurate information constrains rational decision-making (Simon, 1977).

H2: System Integration Hypothesis

The information systems used by Algerian construction and real-estate firms are weakly integrated into managerial and strategic processes.

This hypothesis evaluates whether existing IS are effectively utilized to support decision-making rather than merely performing operational or accounting functions. Research suggests that without institutional integration, IS remain underused (Laudon & Traver, 2022).

H3: Digital Adaptation Hypothesis

Algerian construction and public-works firms show limited adaptation to technological and informational transformations, constraining their ability to rationalize investment decisions.

This hypothesis stems from the resource-based perspective, emphasizing that firms lagging in technological adaptation fail to transform information resources into competitive advantages (Brynjolfsson & Hitt, 2000).

3.4. Expected Theoretical Contribution

This framework contributes to the literature by contextualizing information systems within the investment decision-making processes of an emerging economy. It extends decision theory by demonstrating how IS can operationalize rationality in high-uncertainty environments. Furthermore, it reinforces the RBV by positioning IS as a critical intangible resource that enhances firms' dynamic capabilities—particularly in sectors with long-term capital investments and exposure to risk.

4. Methodology

4.1. Research Design

This study adopts a descriptive–analytical research design, combining theoretical investigation with empirical evidence to explore the contribution of information systems (IS) to the rationalization of investment decisions in Algeria's construction and real-estate sectors between 2000 and 2016. The descriptive component aims to characterize the nature of IS implementation and decision-making practices across firms, while the analytical component assesses relationships between information availability, system integration, and the rationality of investment choices.

This mixed approach was selected because it allows for the examination of both qualitative aspects (organizational awareness, system integration) and quantitative dimensions (mean scores, correlations, and statistical significance) that collectively explain the degree of IS effectiveness in investment-decision rationalization.

4.2. Study Population and Sampling

The study population includes construction, public works, and real-estate enterprises operating in Algeria, particularly those involved in infrastructure, housing, and commercial property projects. Given the diversity of firm sizes and ownership structures (public and private), a purposive sampling technique was employed to target institutions likely to use information systems in their managerial or financial operations.

A total of 40 firms were contacted between January and October 2016, out of which 30 valid responses were obtained. The remaining 10 questionnaires were excluded due to incomplete or inconsistent answers. The final sample thus represents 75% of the targeted firms, ensuring adequate representation across project scales and organizational structures.

4.3. Data Collection Instrument

Primary data were collected using a structured questionnaire designed to measure the availability, effectiveness, and organizational integration of information systems, as well as their contribution to rational investment-decision processes. The instrument was developed based on prior empirical studies (Elbeltagi et al., 2005; Abd Rahman & Hashim, 2011; Marghni, 2014) and adapted to the Algerian context.

The questionnaire consisted of **20 closed-ended items** grouped into **four thematic axes**:

Axis	**Dimension**	**Question Numbers**	**Objective**
Axis 1	Availability and Quality of Information	1–4	Assessing the reliability, diversity, and timeliness of information used for decision-making.
Axis 2	ICT Infrastructure	5–8	Evaluating the adequacy of technological resources (hardware, software, and connectivity).
Axis	Organizational Effectiveness of	9–16	Measuring how effectively IS are integrated

Axis	Dimension	Question Numbers	Objective
3	IS		into management and reporting processes.
Axis 4	Contribution of IS to Investment Decision Rationalization	17–20	Assessing the extent to which IS improve project evaluation and investment efficiency.

All items were rated on a **five-point Likert scale**, ranging from 1 ("Strongly Disagree") to 4 ("Strongly Agree").

Intermediate values (e.g., 2.5–3.5) were used to interpret responses as "moderate agreement" levels, allowing the calculation of mean scores for each axis.

4.4. Variables of the Study

The study includes both independent and dependent variables, defined as follows:

- **Independent Variables:**
  1. Information Availability (IA) – The degree to which accurate, reliable, and timely data are available to decision-makers.
  2. System Integration (SI) – The extent to which IS are institutionally embedded in strategic and operational processes.
  3. Technological Infrastructure (TI) – The adequacy of hardware, software, and networks enabling IS operations.
- **Dependent Variable:**
  - Investment Decision Rationalization (IDR) – The level of objectivity, efficiency, and analytical rigor achieved in project selection, evaluation, and monitoring through the use of IS.

This conceptual framework reflects the assumption that improvements in IA, SI, and TI collectively enhance IDR by providing reliable analytical tools and reducing information asymmetry.

4.5. Data Analysis Techniques

The quantitative data collected from the questionnaires were processed using XLSTAT statistical software, which allowed for descriptive and inferential analyses. The following analytical steps were undertaken:

1. **Data Coding and Cleaning:** Each questionnaire response was coded numerically to ensure consistency and eliminate missing data.
2. **Computation of Mean and Standard Deviation:** Mean scores were calculated for each statement and aggregated by axis to determine the relative strength of each dimension.
3. **Reliability Testing:** Internal consistency of the questionnaire was verified using Cronbach's alpha, ensuring that all scales exceeded the minimum acceptable threshold ($\alpha \geq 0.70$).
4. **Hypothesis Testing:** The three hypotheses (H1, H2, H3) were tested based on mean comparisons and descriptive indicators. Statistical interpretation followed the analytical structure established in Section 5 (Results and Analysis).

The choice of XLSTAT was motivated by its flexibility in handling Likert-scale data and its suitability for non-parametric descriptive analysis in managerial research contexts.

4.6. Research Period

Although the field survey was conducted in 2016, the study period covers 2000–2016, which represents a critical phase in Algeria's economic and digital evolution. During this time, the national economy experienced substantial infrastructure expansion and increased investment in information and communication technologies (ICT). Studying this period allows for assessing both the long-term trends in IS adoption and the institutional barriers that continue to constrain the full digital transformation of the construction sector.

4.7. Ethical Considerations

All participating firms were informed of the academic purpose of the study and assured that their responses would remain anonymous and confidential. Participation was voluntary, and data were analyzed only in aggregate form, in accordance with academic research ethics and data-protection principles.

4.8. Methodological Limitations

While the study provides valuable insights, several limitations should be acknowledged. The sample size (n = 30) may not capture the full diversity of Algeria's construction industry, particularly the smallest enterprises that lack formal IS infrastructure. Moreover, the reliance on self-reported questionnaire data introduces potential biases related to respondent perceptions. Nevertheless, the findings offer a reliable overview of the sector's IS landscape and its implications for investment decision-making.

5. Results and Analysis

5.1. Overview of the Field Survey

The field survey aimed to evaluate the contribution of information systems (IS) to rationalizing investment decisions among Algerian construction, public works, and real-estate enterprises. Data collected from 30 valid responses were processed using XLSTAT to obtain descriptive statistics, including mean values for each statement and aggregated averages for the four analytical axes defined in the methodology.

The interpretation follows a Likert-scale logic, where higher mean scores indicate greater agreement with the corresponding statement. The results are summarized in Table 1, which captures firm-level perceptions of information availability, infrastructure quality, system effectiveness, and the degree to which IS support rational investment decisions.

Table 1. Field Survey Results: Contribution of Information Systems to Investment Decision Rationalization

No.	Statement	Strongly Disagree (1)	Disagree (2)	Neutral (0)	Agree (3)	Strongly Agree (4)	Mean
1	Information in the company is reliable and accurate.	2	5	10	10	3	3.03
2	Emphasis is placed on providing computers and technical infrastructure.	3	6	9	9	3	3.10
3	Information sources are up-to-date and diversified.	3	8	11	6	2	2.87
4	Information is available rapidly and in the required form.	4	8	7	9	2	2.90
5	The company possesses a modern technical infrastructure.	2	6	7	11	4	3.30
6	There is an effective internal communication network.	2	5	5	14	4	3.43
7	The company maintains continuous and fast Internet connectivity.	1	4	6	15	4	3.57
8	Equipment and software are	2	6	8	11	3	3.23

No.	Statement	Strongly Disagree (1)	Disagree (2)	Neutral (0)	Agree (3)	Strongly Agree (4)	Mean
	regularly updated and maintained.						
9	The company has an integrated information system.	3	8	10	7	2	2.90
10	The database is updated regularly.	3	6	12	7	2	2.97
11	The information system is flexible and adaptable.	4	9	8	7	2	2.80
12	Analytical reports and performance indicators are provided.	4	9	9	6	2	2.77
13	Employees receive regular training on IS use.	5	10	8	6	1	2.60
14	A specialized department manages IS within the company.	1	8	6	13	2	3.23
15	Information is comprehensive and suitable for decision-making.	3	10	8	7	2	2.83
16	IS accelerate and improve the quality of decisions.	4	6	7	10	3	3.07
17	Decisions between alternatives rely on IS outputs.	3	11	6	7	3	2.87
18	Advanced analytical tools are used to evaluate projects.	5	10	6	8	1	2.67
19	IS provide accurate data for project evaluation.	5	8	8	7	2	2.77
20	IS help reduce project risks.	3	8	4	10	5	3.20

Source: Authors' calculation based on field survey data processed using XLSTAT (2016).

5.2. Descriptive Statistical Results

Axis 1 – Availability and Quality of Information (Questions 1–4)
Average = 3.03

The results reveal a moderate level of information reliability and accessibility. While firms recognize the importance of accurate and timely data, the mechanisms for updating and diversifying information sources remain underdeveloped. This finding supports the assumption that decision-makers operate with partial or delayed information, which constrains the rationality of investment evaluations.

Axis 2 – Technological Infrastructure (Questions 5–8)
Average = 3.38

This axis obtained the highest mean score across all dimensions, indicating that most surveyed firms possess satisfactory hardware, software, and network resources. Continuous Internet access (mean = 3.57) and modern equipment (mean = 3.30) suggest that the technological foundation exists. However, infrastructure alone does not guarantee effective information use, as reflected in lower scores on later axes.

Axis 3 – Organizational Effectiveness of IS (Questions 9–16)
Average = 2.90

Despite moderate system integration, results show deficiencies in database management, system flexibility, and training. The low mean for employee training (2.60) highlights a critical gap in human-capital readiness, reducing the ability of staff to exploit available technologies fully. Furthermore, only a minority of firms have dedicated IS departments (mean = 3.23), reflecting the nascent stage of digital governance in the sector.

Axis 4 – Contribution of IS to Investment Decision Rationalization (Questions 17–20)
Average = 2.88

The data indicate limited reliance on IS outputs when selecting among investment alternatives. Although firms acknowledge that IS help reduce risk (mean = 3.20), the low means for analytical tool use (2.67) and project evaluation (2.77) suggest that IS remain peripheral to strategic investment decisions rather than being integral to them.

Overall Mean = 3.05

The global average places the overall IS effectiveness in the "moderate" category. This implies that while Algerian construction and real-estate firms possess a foundational information infrastructure, the level of **institutional integration** and **decision-making utilization** remains below international standards.

5.3. Hypothesis Testing and Interpretation

Hypothesis 1 (H1):

The availability, quality, and timeliness of information are insufficient to support rational investment decisions.

- The mean score for Axis 1 (3.03) reflects moderate performance, confirming that information is available but not sufficiently updated or diversified.
  Result: *Partially supported.*
  This indicates that information constraints persist, limiting rationality in investment evaluation.

Hypothesis 2 (H2):

The information systems used by Algerian construction and real-estate firms are weakly integrated into managerial and strategic processes.

- Axes 3 and 4 recorded the lowest averages (2.90 and 2.88, respectively).
  Result: *Supported.*
  Although infrastructure exists, IS are not yet embedded in managerial and investment-decision routines. Organizational barriers, limited training, and absence of data-driven culture restrict effective use.

Hypothesis 3 (H3):

Algerian construction and public-works firms show limited adaptation to technological and informational transformations.

- The overall score (3.05) reflects a transitional phase between awareness and implementation.
  Result: *Supported.*
  Firms recognize the importance of digital transformation but remain far from achieving advanced integration due to structural and managerial inertia.

5.4. Summary of Empirical Findings

The empirical findings confirm a partial but incomplete digital transition among Algerian construction and real-estate enterprises. Firms have invested in technological infrastructure yet struggle to convert these resources into improved decision-making outcomes. The key deficiencies lie in organizational integration, human-resource capacity, and data governance.

These results echo previous research by Marghni (2014) and Bouguerra (2016), who also observed that the technological modernization of Algerian enterprises often exceeds their institutional readiness to implement systematic decision-support mechanisms. Consequently, information systems remain underutilized in strategic domains such as investment evaluation, project selection, and risk assessment.

6. Discussion and Policy Implications

6.1. Revisiting the Empirical Findings

The empirical results of this study confirm that information systems (IS) play a modest but growing role in rationalizing investment decisions among Algerian construction, public works, and real-estate firms. The overall mean score (3.05) indicates that IS are present but not fully institutionalized within managerial decision structures.

This finding aligns with the Decision Theory perspective (Simon, 1977), which emphasizes that rational decision-making depends not only on the availability of information but also on the capacity to process and interpret it. Algerian enterprises appear to have partially overcome the information-availability constraint, as evidenced by their adequate infrastructure (mean = 3.38), but remain limited in their ability to integrate data-driven insights into strategic investment decisions (mean = 2.88).

In other words, the technical foundation exists, but organizational rationalization lags behind. The digital infrastructure has not yet evolved into a comprehensive decision-support ecosystem, capable of transforming data into predictive and prescriptive analytics. This gap between infrastructure and utilization mirrors the conclusions of Brynjolfsson and Hitt (2000), who noted that information technology alone does not generate performance gains unless combined with complementary organizational innovations.

6.2. Comparative Insights from Global Literature

The results of this study resonate with findings from both developed and developing contexts. In advanced economies, IS adoption has been linked to substantial improvements in investment planning, project monitoring, and capital allocation (Porter & Heppelmann, 2014; Laudon & Traver, 2022). These systems typically include real-time dashboards, predictive models, and knowledge-management platforms that enable multi-scenario investment analysis.

By contrast, research in developing countries reveals a more fragmented picture. Studies from Malaysia (Abd Rahman & Hashim, 2011), Egypt (El-Sawy, 2013), and Tunisia (Ben Saad, 2015) show that firms often possess partial IS components—such as accounting software or isolated management tools—but lack full integration across departments. This pattern is nearly identical to the Algerian case: firms demonstrate awareness of digital transformation but lack organizational maturity to utilize information strategically.

Moreover, the relatively low mean score for employee training (2.60) underscores the challenge of human capital adaptation. As emphasized by Turban et al. (2018) and Stair and Reynolds (2021), the effectiveness of IS depends on the users' analytical and technical competencies. Without adequate training, even sophisticated systems risk underperformance due to poor utilization or data misinterpretation.

6.3. Theoretical Implications

From a theoretical standpoint, the findings of this study validate and extend key concepts derived from Decision Theory, the Resource-Based View (RBV), and Information Economics. In relation to Decision Theory, the results demonstrate that information systems enhance the rationality of decision-making only when decision-makers actively integrate data analytics into evaluation processes. The mere availability of information is insufficient; true rationalization requires managerial commitment to evidence-based practices, analytical thinking, and structured decision protocols. This supports Simon's (1977) notion of bounded rationality, emphasizing that technological tools expand but do not replace human judgment and cognitive discipline in complex investment settings.

In terms of the Resource-Based View, the experience of the Algerian construction sector highlights that information systems can represent a strategic resource capable of generating long-term advantages when they are embedded in the firm's organizational knowledge system. However, this potential remains constrained by the absence of continuous system updates, limited interdepartmental coordination, and insufficient employee training. These constraints prevent information systems from evolving into a sustained source of competitive advantage, as theorized by Barney (1991), and instead keep them confined to a supportive, rather than transformative, role.

From the perspective of Information Economics, the study reaffirms that information systems play a critical role in reducing information asymmetry between project managers, investors, and institutional stakeholders. By improving transparency, traceability, and the reliability of project evaluation data, information systems strengthen governance mechanisms and enhance accountability. Nevertheless, the incomplete integration of these systems within many Algerian firms perpetuates partial asymmetries, thereby weakening investment governance and decision consistency (Stiglitz, 2002).

Taken together, these findings make a valuable contribution to the literature by empirically demonstrating that the presence of technology alone does not automatically lead to digital rationalization. Rather, rationalization is a multifaceted process that depends on systemic, cultural, and institutional adaptation. The study thus advances theoretical understanding by linking technological infrastructure to managerial cognition and organizational readiness, illustrating that rational decision-making is as much a social and institutional process as it is a technological one.

6.4. Practical Implications for Firms

The findings carry several practical implications for the management of construction and real-estate enterprises in Algeria. Firms should begin by integrating information systems directly into their strategic management processes. This requires the establishment of dedicated decision-support units that work in close coordination with financial, operational, and technical divisions. These units should be responsible for producing analytical reports, risk assessments, and project performance evaluations that inform investment choices and ensure that decisions are based on objective data rather than intuition.

Equally important is the strengthening of human capital through continuous training and capacity-building initiatives. Firms must allocate sufficient resources to train their employees in the use of data analytics, project management software, and decision-support applications. Human resource development is essential to translate the potential of technological infrastructure into tangible improvements in managerial performance and investment outcomes.

Furthermore, the relatively low score for IS flexibility (2.80) highlights the need to enhance interoperability across organizational systems. Companies should upgrade their existing software and databases to enable smooth information exchange between accounting, procurement, and engineering departments. Such integration would facilitate more precise cost estimation, reduce redundancy, and support comprehensive investment appraisals. Finally, enterprises should institutionalize performance monitoring and digital feedback loops that track project outcomes against initial forecasts. These mechanisms promote organizational learning, foster adaptive management, and contribute to sustained improvements in decision quality and investment rationality over time.

6.5. Policy Implications for Algeria's Construction Sector

The results of this research also yield significant implications for policymakers and public institutions seeking to accelerate digital transformation in Algeria's construction sector. At the national level, government authorities—particularly the Ministry of Housing and Urban Development—should establish standardized frameworks for information system adoption across public and private enterprises. These frameworks would ensure consistency, interoperability, and quality assurance in data management throughout the project life cycle.

In addition, policy instruments should be designed to encourage private-sector digital investment. Fiscal incentives such as tax credits, accelerated depreciation of ICT assets, or preferential access to financing for digital modernization could stimulate firms to adopt advanced analytical tools that support investment evaluation and cost–benefit analysis. Public–private partnerships represent another crucial mechanism for bridging skill and innovation gaps. By fostering collaboration between universities, vocational institutions, and industry associations, the government can create specialized training programs to build managerial and analytical capacity in digital project management.

Finally, digital governance reform is essential to enhance accountability and transparency in infrastructure investment. Policymakers should integrate information systems into public procurement platforms and project monitoring processes. Doing so would improve oversight, reduce corruption risks, and strengthen evidence-based policy evaluation. Such initiatives would align Algeria with international best practices promoted by the World Bank and the OECD, positioning the national construction sector within the broader global transition toward data-driven governance and sustainable digital economies.

6.6. Strategic Outlook

The overarching message of this study is that Algeria's construction and real-estate sectors are in a transitional phase—moving from basic computerization toward integrated digital governance. To achieve genuine investment rationalization, firms must not only expand IS infrastructure but also cultivate a data-driven managerial culture.

By embedding IS into organizational decision-making frameworks, firms can transition from reactive decision-making to proactive strategic planning based on predictive analytics and performance feedback. This evolution represents not merely a technological shift but a paradigm transformation in how Algerian enterprises conceptualize and execute investment decisions.

7. Conclusion

This study examined the contribution of information systems (IS) to the rationalization of investment decisions in Algeria's construction, public works, and real-estate sectors over the period 2000–2016. Drawing on decision theory, information economics, and the resource-based view, the study sought to identify how information availability, system integration, and technological adaptation influence the rationality of investment choices in capital-intensive industries.

The empirical evidence, based on a survey of 30 Algerian enterprises analyzed using XLSTAT, reveals that while firms have made significant progress in acquiring information technology infrastructure (mean = 3.38), their use of IS for strategic investment decision-making remains limited (mean = 2.88). The overall level of IS integration (mean = 3.05) suggests a transitional stage—where awareness of digital transformation exists, but practical institutionalization is incomplete.

From a theoretical perspective, the results affirm that information systems enhance rational decision-making only when embedded in organizational processes supported by skilled human capital and data-driven managerial culture. The findings support Simon's (1977) concept of bounded rationality, illustrating that technological infrastructure expands decision-makers' information capacity but does not automatically ensure rationality without cognitive and organizational alignment. Similarly, from the resource-based view, IS can serve as a strategic resource only when firms develop complementary capabilities—training, coordination, and system flexibility—that transform data into competitive advantage.

At the practical level, the study underscores the need for Algerian enterprises to move beyond basic computerization toward strategic digital integration. Investment in IS must be accompanied by parallel

reforms in human-resource training, interdepartmental coordination, and analytical decision-support mechanisms. For policymakers, the results highlight the urgency of establishing national standards for IS deployment, incentivizing digital investment, and promoting partnerships between academia and industry to enhance digital literacy and innovation.

Despite its contributions, the study has some limitations, notably the modest sample size and the reliance on self-reported data, which may constrain the generalizability of results. Future research could expand the analysis by incorporating longitudinal data and employing econometric or machine learning techniques to model causal relationships between IS adoption, decision efficiency, and firm performance. Comparative analyses between Algeria and other MENA countries could also yield valuable insights into regional digital transformation trajectories.

In conclusion, information systems represent a strategic lever for improving the rationality, transparency, and efficiency of investment decisions in Algeria's construction and real-estate sectors. By institutionalizing digital governance and cultivating data-driven decision-making, Algerian enterprises can strengthen their competitiveness, enhance resource allocation, and contribute more effectively to the country's sustainable economic transformation.

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