
The role of the information system on decision-making case: SONATRACH-LQS activity

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Abstract---In today's competitive environment, information systems (IS) are increasingly recognized as strategic assets that enhance decision-making, efficiency, and organizational performance. This study examines the contribution of IS to decision-making within SONATRACH-LQS, focusing on the relationship between system quality, information quality, service quality, and decision outcomes. A quantitative approach was adopted, with 86 valid responses collected from purposively sampled employees engaged with IS. Data analysis, conducted through SPSS and SmartPLS, revealed that IS integration improves workflow, communication, and data accessibility, thereby fostering transparency and collaboration. The results confirm that system, information, and service quality enhance both system use and user satisfaction, contributing to stronger organizational performance, despite occasional usability challenges. The study underscores IS as enablers of competitiveness and strategic monitoring, recommending continuous training, system modernization, data centralization, user-friendly design, and enhanced security.

Keywords---Information Systems (IS) ; Decision-Making; SONATRACH-LQS ; System Quality ; Organizational Performance.

Jel Classification Codes: M10; M15.

Introduction:

In today's competitive environment, organizations increasingly rely on data science to improve decisions, optimize processes, and maintain a competitive edge. Data analysis and visualization, as key elements of data science, transform raw data into actionable insights that can be communicated effectively to relevant stakeholders (Provost & Fawcett, 2013). The rapid expansion of digital technologies and their integration into economic and social domains have further reinforced the strategic importance of information systems (IS), linking organizational success closely to IS performance.

This study aims to examine the interaction between information systems and decision-making processes. Open communication and collaboration across organizational levels are also considered vital for gathering diverse perspectives and enhancing decision quality.

Information systems today serve as more than operational support tools; they are strategic assets that enhance organizational reputation, productivity, and innovation. They enable a wide range of applications, from competitive landscape analysis and customer relationship management to financial oversight and human resource administration. By providing real-time data and insights, IS help organizations streamline operations, reduce costs, and achieve strategic objectives.

This research aimed to assess whether information factors play a role in decision path moreover it studies the involvement of information system in company's decision making and how it affects the decision process.

As a consequence, our main research question for this study is as following:

How does the information system contribute in a company's decision making process?

The hypothesis: To address this question, the study formulates the following hypotheses:

H 0: the information system has no influence on the decision-making process.

H 1: the information system has an influence on the decision-making process.

The analysis undertaken in this research aims to either confirm or reject these hypotheses through empirical investigation.

Objectives of the study:

- To analyze how information systems contribute to decision-making in organizations.
- To explore the interaction between IS and decision-making processes.
- To assess the extent to which IS can improve decision quality and influence overall organizational performance.

Research approach and methodology:

The study assessed the role of the information system in decision-making at SONATRACH-LQS through a quantitative survey. A purposive sampling method was applied, targeting employees who use the information system. From 100 distributed questionnaires, 86 valid responses were collected during face-to-face interviews conducted between 20 and 27 February 2025. The survey ensured comprehension and completeness of responses. Data analysis involved univariate and bivariate methods, reliability testing, and correlation analysis using Spearman's coefficient to examine relationships between independent and dependent variables. SPSS V.25 was used for statistical analysis, SmartPLS V.4 for reliability testing and hypothesis verification, and Google Sheets for data visualization.

I. The Information System in organization

The information system (IS) is a complex and essential tool for modern organizations, serving as a backbone for collecting, processing, storing, and distributing information. It supports both operational activities and strategic decision-making by enabling timely and accurate access to relevant data. This section explores the key aspects of successfully implementing an IS within an organization, emphasizing the principles and structured methodology of system design and development.

I.1. Definitions of the Information System

From a managerial perspective, « *an information system (IS) integrates people, hardware, software, communication networks, data resources, and organizational policies to collect, process, store, and distribute information within an organization.* » (O'Brien & Marakas, 2011, p. 04) This definition emphasizes the interconnection between human resources, technical infrastructure, and organizational processes.

Similarly, (Bourgeois, James, & Shouhong, 2019, p. 03) described IS as « *a combination of hardware, software, and telecommunications networks used to generate, manage, and share valuable data in organizational settings.* »

(Laudon & Laudon, 2022, p. 15) further highlight the functional role of IS, defining it as « *a set of interrelated components that support decision-making, control, and operational, managerial, and strategic activities.* »

In summary, an information system can be viewed as a socio-technical framework that integrates technology, human actors, and processes to manage information flows effectively, thereby enhancing organizational efficiency, adaptability, and strategic performance.

I.2. The Components of Information Systems

(Bocij, Greasley, & Hickie, 2019) identify four primary components: technology (hardware, software, and networks), data, people, and processes, emphasizing that effective IS implementation requires the alignment of all these components to organizational objectives.

(Bourgeois, James, & Shouhong, 2019) (Stair & Reynolds, 2020) outline a similar model, defining IS components as:

- **Hardware:** Physical devices (computers, drives, etc.) for input, processing, storage, and output.
- **Software:** Programs directing hardware; includes operating systems and applications.
- **Data:** Raw facts organized into databases for decision-making and improvement.
- **People:** Users and IT specialists who design, manage, and utilize systems.
- **Processes:** Structured workflows integrating IS into activities for efficiency and competitiveness.

(Pearlson, Saunders, & Galletta, 2019) offer a broader socio-technical framework, grouping IS elements into technological components (hardware, software, networks, and databases) and organizational components (people, processes, and structure). They stress that ignoring the human and procedural aspects often leads to technological underperformance.

I.3. The importance of information system in the organization

Information systems (IS) are highly adaptable tools that can be tailored to organizational needs, influencing strategies, culture, and business processes, and sometimes driving structural change. Their adoption often requires personnel adjustments, employee retraining, and strong managerial communication to overcome resistance to change. Organizations that succeed are those that select IS aligned with their objectives, invest in employee training, and ensure continuous system updates. Fundamentally, IS facilitate the collection, processing, and dissemination of relevant data, thereby enhancing operational efficiency and supporting managerial decision-making by delivering timely and tailored information. (Mrabet & Benabdejlil, 2022)

I.4. Decision-Making

Decision-making is a problem-solving process that ends when a satisfactory solution is found. As a result, decision-making can be viewed as an argumentative or emotive process that is rationally or irrationally based on implicit or explicit assumptions.

According to (Mintzberg, 1973), a decision, whether it's made individually or in a group, can be defined as "the commitment to an action, that is, an explicit intention to act. The purpose of a decision is to solve a problem that occurs in the organization or the individual."

According to (Simon, 1957), decision-making is a process whereby an individual selects one option among several alternatives to achieve a satisfactory solution to a given problem. This concept highlights that every behavior entails a choice (whether conscious or unconscious) made from the range of actions that are materially possible for the decision-maker and for those under their influence or authority. (Mrabet & Benabdejlil, 2022, pp. 127-128)

I.5. The influence of Information on decision-making:

The quality and accessibility of information are decisive factors in shaping organizational choices. (Hambrick & Mason, 1984) argue that leaders interpret reality through three interrelated filters: a limited field of vision shaped by cognitive and value constraints, selective perception that highlights some elements while ignoring others, and interpretation influenced by prior knowledge and experience. These constraints prevent complete certainty in decision-making. Information helps overcome such limitations by broadening the leader's perspective, clarifying environmental conditions, identifying alternatives, and anticipating outcomes. In this regard, information systems (IS) have become indispensable: they enhance information quality, support decision-making at all levels, promote data-driven practices, increase agility, reduce costs and delays, integrate advanced technologies, and mitigate cognitive biases. In a competitive environment, organizations that fail to fully exploit IS capabilities risk losing their strategic advantage.

II. Analysis of data and interpretation of results

In this section, we present the methodological approach adopted to answer our research questions, analyze the responses collected through our survey, and interpret and evaluate the final results obtained from this empirical study.

The study was conducted within **SONATRACH-LQS**, a subsidiary of Algeria's national oil and gas company, SONATRACH, which plays a key role in the exploration, production, processing, and commercialization of hydrocarbons. The company manages upstream and downstream operations, including refining and distribution of petroleum products, while ensuring compliance with safety and environmental standards. SONATRACH-LQS also integrates advanced information systems to support data-driven decision-making, enhance collaboration, and improve operational efficiency, contributing significantly to Algeria's energy sector and overall economic development.

II.1. The reliability of the research model

This model highlights that IS importance is an exogenous latent independent variable. The decision construct is considered an endogenous latent dependent variable, reflecting the outcomes of the system's perceived importance and efficiency.

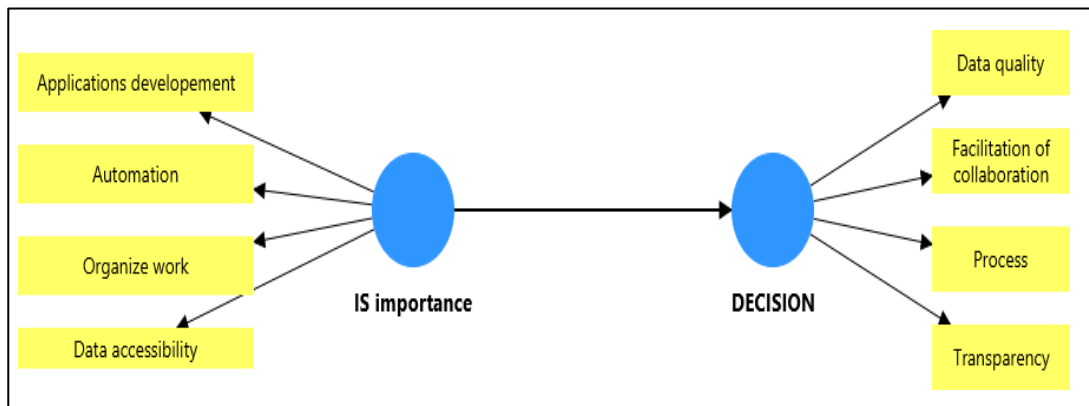


Figure 01: The basic model of research

Source: Generated using the Smart PLS software.

In SmartPLS, the items (observable variables) are linked to the constructs (latent variables) of the model using the partial least squares (PLS) statistical method, which uses an iterative approach to determine the most significant relationships, thus offering the possibility to model the links between latent variables and observable variables.

This figure presents the outer loadings,, which measure the strength of association between latent constructs and their corresponding observed variables. For the

constructs, we admit correlations over (0,7), which means that over 70% of the variance in the observable variable is explained by the construct. We also observe that some items have slightly lower loadings; in other words, they have a weak association with the corresponding constructs. Caution hold is taken when generalizing these items to different contexts or domains. Overall, the retained items demonstrate an acceptable range of loadings, proving also the reliability of items.

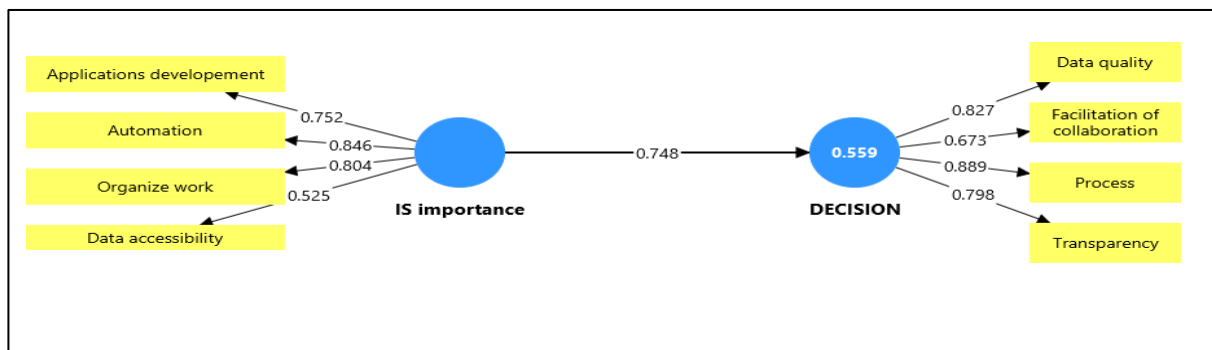


Figure 02: The structural model after applying the Algorithm method

Source: Generated using the Smart PLS software.

The correlation matrix highlights a strong positive correlation between IS importance and the decision (74.8%); otherwise, information efficiency has a role but is not tightly correlated with either decision quality or IS importance.

Table 01: the reliability of constructs

	Cronbach's alpha	Composite reliability (rho...)	Composite reliability (rho_c)	Average variance extracte...
DECISION	0.810	0.826	0.876	0.641
IS importance	0.715	0.743	0.827	0.551

Source: Generated using the Smart PLS software.

To assess the reliability and validity of the measurement model, Cronbach's alpha, composite reliability, and average variance extracted (AVE) were examined in the table above. All constructs demonstrate acceptable internal consistency with the composite reliability over 0.8, including the decision reliability, which is 87.6%, and the IS importance reliability, which is 82.7%.

In addition, we used the validity convergent with the AVE index, "Average Variance Extracted," which measures the variance average extracted by the items of the questionnaire. The value of this index must be greater than 0.5, as it shows all AVE values are above the 0.5 benchmark. The decision is the IS importance, respectively, with these values: 0.641 and 0.551, indicating satisfactory convergent validity. These

results confirm that the measurement model meets the recommended criteria for reliability and validity in PLS-SEM analysis.

II.2. The validity of the structural model

After confirming the reliability of our model it is essential now to check its validity.

Table 02: R-square matrix

	R-square	R-square adjusted
DECISION	0.559	0.554

Source: Generated using the Smart PLS software.

This table highlights that 55,4% of the variability in the dependent variable (decision) is explained by the independent variable (IS importance), Which indicates that there are other factors that impact the decision. In a multiple regression model where both independent and dependent variables are continuous, one of the most common method for calculating the effect size of each of the variables or construct is Cohen's f^2 . Cohen categorized effect size as small, medium or large.

Table 03: F-square matrix

	DECISION	IS importance
DECISION		
IS importance	1,267	

Source: Generated using the Smart PLS software.

In our model, we highlight first of all that the IS importance has an extremely large effect on the decision, because the value of F^2 is equal to 1,267, which is over 0.35; otherwise, the information efficiency has a moderate effect on the decision.

As a result, we observe that the IS importance plays a significant role in making decisions; however, information efficiency plays a small but noticeable effect on the decision.

II.3. Descriptive statistics

By using tables and charts, we'll have a clear vision about the data concerning our sample to interpret and clarify some points, starting with general information, moving forward to the information system, and concluding with the decision.

II.3.1. Axe 01: Personal information

The demographic profile of the 86 respondents shows a predominance of women (67%) compared to men (32.6%). The majority of employees are aged over 40 (86%), with the largest group between 40-49 years (52%), followed by those aged 50-59

years (34%). Younger employees are underrepresented, with only 1% aged 20-29. This indicates an experienced and older workforce.

More than half of employees (54) have remained in the same position for over 15 years, while 17% have 5-10 years of tenure and 16% between 10-15 years. Only 3.5% have been in their role for less than 5 years. In terms of hierarchy, the workforce is overwhelmingly composed of executives (98%), with only 2% managers. Regarding education, the sample is highly qualified: 52% hold a bachelor's degree and 37% a master's degree, while only a minority possesses high school (3.5%), doctorate (2%), or technician (4%) qualifications.

II.3.2. Axe 02: the importance of information system.

The data above indicate that out of 86 respondents:

➤ ***Is the information system integrated into all structures?***

we observe that 32.6% of employees agree and 47.6 % totally agree that the information system is well integrated into the structures in the company, while 18.6% are neutral about it and only 1.2% disagrees about it, which reflects that the company did integrate the information system into all structures and that more than half of employees have access to it.

➤ ***Does the information system allow easy access to company data?***

A total of 38.4% agree and 33.8% totally agree that the system allows easy access to company data. While 51.2% are neutral, only 10.5% disagree or strongly disagree, showing a majority find the system accessible, though a notable portion is undecided. This reflects that the company allows the workforce access to data but with limitations.

➤ ***The system helps organize work.***

A combined 76.7% of employees agree or totally agree that the system helps them organize their work, with only 1.2% disagreeing, indicating a widely recognized functional benefit.

➤ ***Strategic applications***

Around 69.8% of respondents agree or totally agree that the company develops strategic monitoring applications, while only 2.3% of employees suggest broad support.

➤ ***Automation improves decision-making speed.***

A strong majority, 86%, agrees or totally agrees that automation enhances decision speed, with only 2.3% expressing disagreement, reflecting their negative perception about it.

II.3.3. Axe 03: the decision making process

The data above indicate that out of 86 respondents:

➤ **Use of Information in Decision-Making:**

More than half 3.5% agree and 50% totally agree of respondents affirm using information in their decision-making, while 29.1% remain neutral. Only 17.5% (3.5% strongly disagree and 14% disagree) do not use information, reflecting that most employees recognize and utilize data in their decisions.

➤ **Data Quality for Decision-Making:**

About 58.1% agree and 15.1% totally agree of respondents believe the data quality is adequate for decision-making. Only 3.5% disagree, and 23.3% are neutral, indicating that the majority find the system's data reliable and useful especially for modeling decisions.

➤ **Structured Decision Processes:**

48.8% agree and 25.6% totally agree of the workforce, which is a strong majority, affirm that decision-making follows structured steps, and while 23.3% are neutral. Only 2.4% express disagreement, showing widespread understanding of systematic decision processes.

➤ **Transparency and Organizational Structure:**

A large portion of employees, explained by 57% who agree and 19.8% who totally agree, see the system as enhancing transparency and structure in decision-making. However, 20.9% are neutral, and a small 2.3% disagree, showing overall positive perception about the transparency of the decision due to the information system.

➤ **Support for Team Collaboration:**

57% of respondents agree, and 18.6% of them totally agree, that the system supports team collaboration. 23.3% are neutral, and only 1.2% disagree, reflecting that the majority of the workforce collaboration is generally well supported by the system.

II.4. Correlations

This type of analysis allows us to determine the correlations between the different variables.

Table 04: Analysis of the correlation between the application development and the IS automation

	The company develops applications that allow to monitor strategic orientations.	
The automation of the information system improves the speed of decision-making.	Pearson Correlation	,648**
	Sig. (2- tailed)	0,000
	N	86

Source: Generated using the SPSS software.

The results present in that table shows the Pearson correlation is 0,648 which indicates a strong positive correlation between this two items , moreover the value of SIG for the correlation of the two items is under 0,01 which means that they're statistically significant .this reflects that better automation helps organizations develop tools that support faster and more effective decision-making.

Table 05: Analysis of the correlation between the decision-making transparency and the facilitation of collaboration between teams

	The information system facilitates collaboration between teams to model decisions	
The information system makes the decision-making process more transparent and structured.	Pearson Correlation	,624**
	Sig. (2-tailed)	0,000
	N	86

Source: Generated using the SPSS software.

We can find in this table above that the Pearson correlation is 0.624, which reflects a strong positive correlation between these two items. Furthermore, the value of SIG for the correlation of the two items is under 0.01, which means that they're statistically significant. Consequently, this means that when IS helps teams work.

II.5. Test of hypothesis:

Table 06: Test of hypothesis

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
IS importance -> DECISION	0.748	0.762	0.052	14.391	0.000

Source: Generated using the SmartPLS software

According to Smart PLS's findings, we observe that the p-value (P=0.00) is under 0.05, which indicates that the principal hypothesis of our research, which is "The information system has an influence on the decision-making process," is confirmed. Also, the relation is statistically significant between the 2 variables (IS importance and decision).

The figure below shows that after conducting a hypothesis test, our hypothesis was confirmed, with a risk of error equal to zero.

II.6. Discussion:

The results of this study clearly demonstrate that the information system (IS) at SONATRACH-LQS plays a decisive and multidimensional role in the decision-making process. The analyses conducted across the different axes (IS importance, decision-

making practices) and statistical correlations highlight a consistently positive evaluation of the IS and its organizational impact.

Findings from Axe 02 indicate a strong integration of the IS within the company's structures. Employees largely affirm that the system provides accessible and functional data, supports work organization, and facilitates the development of strategic monitoring applications. The widespread recognition of the benefits of automation confirms its contribution to faster and more efficient decision-making.

Results from Axe 03 reinforce this influence by showing that decision-making relies heavily on the availability, quality, and relevance of information provided by the IS. Respondents highlight structured decision procedures, enhanced transparency, and stronger team collaboration enabled by IS tools. These elements collectively contribute to more coherent, traceable, and reliable decision processes.

The correlational analyses further validate these observations. Strong positive correlations between IS automation and strategic application development, as well as between transparency and collaboration, show that IS components operate synergistically. These relationships indicate that technological integration strengthens both operational performance and strategic decision support.

Finally, hypothesis testing using SmartPLS confirms the main research proposition: the information system has a significant and positive influence on the decision-making process. Statistical significance ($p = 0.00$) underscores the robustness of this relationship and aligns with theoretical perspectives that position IS as strategic assets essential to organizational performance.

Conclusion:

The study highlights the strategic value of information in contemporary organizations and affirms the central role of information systems (IS) in enabling data-driven decision-making and effective strategic monitoring. Drawing on Simon's decision-making framework, the findings show that the impact of an IS is closely tied to the quality, accessibility, and usability of the information it delivers, as well as the ability of users to integrate this information into structured decision processes.

Results from the SONATRACH case study (86 employees) reveal that IS implementation significantly improved workflow coordination, interdepartmental communication, and data availability, thereby enhancing transparency and coherence in managerial decisions. The system supported the different stages of Simon's model (intelligence, design, and choice) facilitating more rational and informed decisions. Although respondents expressed confidence in the reliability and relevance of system-generated information, some usability challenges persisted, particularly

regarding interface complexity. Overall, IS adoption strengthened efficiency, transparency, and alignment with organizational objectives.

- The study proposes several recommendations for strengthening IS effectiveness:
- Training and skill development through continuous programs to reduce digital skill gaps.
- System modernization via ERP/CRM platforms, automation, and cloud integration.
- Data quality and centralization to ensure reliability and standardized management.
- User-friendly design with simplified interfaces, dashboards, and visualization tools.
- Enhanced security measures including strong authentication, regular updates, and backups.
- Stakeholder involvement through leadership support and cross-departmental collaboration.

The findings confirm that a well-integrated IS improves decision-making by enhancing information quality, collaboration, and analytical capacity. Sustaining these benefits, however, requires ongoing investment in modernization, user training, and interface optimization. The study therefore positions IS as strategic assets that contribute directly to organizational performance and calls for further research on IS integration within Algerian institutions.

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