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Decision Support Systems in Algerian Institutions: Evidence from the Insurance Sector

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Abstract :

This research aims to examine the current state of DSS integration in Algerian insurance companies and evaluate their role in supporting decision-making efficiency and effectiveness. To achieve this objective, the study adopted a descriptive-analytical approach combined with a case study methodology, relying on questionnaire data collected from 201 managers across 19 insurance companies operating in Algeria. The findings indicate that 42.9% of the surveyed companies rely on function-specific information systems, 39.9% have adopted Enterprise Resource Planning (ERP) systems, whereas only 17.2% use dedicated DSS. The results further reveal positive evaluations regarding information availability and decision-making efficiency, reflecting the contribution of integrated information systems to improving decision-support practices. The study highlights the need for targeted managerial training, phased DSS integration into existing ERP systems, stronger technological infrastructure, and improved interdepartmental coordination to support more effective decision-making practices in the Algerian insurance sector.

Keywords: Decision Making, Insurance Sector, Decision Support Systems, Information Technology.

Jel Classification Codes : D83, G22, L86, O33.

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1. Introduction.

The decision-making process represents the core of administrative activity and serves as a fundamental pillar for the success of institutions in achieving their objectives. It is considered one of the most essential managerial functions upon which various administrative activities in modern organizations rely. The formulation of strategic directions and institutional policies, as well as operational effectiveness and the ability to adapt to environmental changes are all closely associated with management's capability to make sound and timely decisions.

As a result of the rapid developments in the business environment, organizations are confronted with increasing numbers of variables that influence the quality and efficiency of managerial decisions. Consequently, the decision-making process has become more complex and challenging, particularly with regard to the availability of the necessary data and information required to reduce uncertainty faced by decision-makers. This situation has created a strong need for tools capable of supporting decision-makers by providing them with accurate information and appropriate analyses in a timely manner .In this context, Decision Support Systems (DSS) have emerged as an effective tool designed to provide the environment, mechanisms, and technologies that enhance applicable decision-making. These systems support decision-makers in addressing semi-structured and unstructured problems through data analysis, the provision of qualitative information, and the generation of multiple alternatives leading to optimal decision choices.

In Algeria, particularly within the insurance sector - which is witnessing increasing competition as well as significant regulatory and technological developments - there is an urgent need to integrate advanced systems that enhance decision-making. DSS offer great potential in terms of data analysis, alternative evaluation, and forecasting future trends, thereby contributing to more efficient administrative decisions and improved organizational performance. From this perspective, we can raise the following research question:

To what extent have Algerian Institutions succeeded to integrate Decision Support Systems and using them effectively to improve their decision-making processes?

Significance of the Research: The importance of this study is reflected in the following points:

- Contributing to the enrichment of the literature on the applications of Decision Support Systems within the service sector.
- Highlighting the critical role of Decision Support Systems in enhancing the quality of decisions in modern organizations.
- Providing a scientific analysis of the current state of integrating such systems in Algerian enterprises.

Research Objectives: This study aims to:

- Examine the theoretical and conceptual framework of Decision Support Systems and their main components.
- Identify the current state of integration and use of Decision Support Systems within the Algerian insurance sector.
- Evaluate the role of these systems in enhancing the efficiency and effectiveness of decision-making in insurance companies.

Research Methodology: This study employs both descriptive and analytical approaches to address the theoretical dimension of the research. Regarding the empirical dimension, the case study approach was adopted alongside the previous methods to collect relevant data about the phenomenon under investigation. The collected data were then described and analyzed using SPSS (Version 26) in order to derive meaningful findings and reach the desired results.

Literature Review:

A wide range of research has examined the role and impact of Decision Support Systems (DSS) in improving decision quality and institutional performance across different sectors. Through an early survey on DSS applications, (lttmann, 1984) emphasized that these systems assist decision-makers in handling semi-structured and unstructured problems more effectively by integrating data, analytical models, and interactive interfaces, thereby enhancing responsiveness and decision accuracy. In the Algerian context, several studies have reported positive outcomes of DSS implementation within public institutions. For example, (Sherof & Karim , 2022), in a study conducted on the Ministry of Water Resources in Algeria, demonstrated a statistically significant positive effect of DSS use within its central directorates. Similarly, (Bougada , 2018) examined a port authority in Algeria and found a strong relationship between DSS integration and the quality of administrative decisions, highlighting the importance of technical, organizational, and managerial components for successful implementation.

Although research on DSS within the insurance sector is still limited, available studies indicate that these systems support critical functions such as crisis management, risk assessment, and operational decision-making. An empirical study by (Al-Saqa & Al-Sufi, 2021) in the Palestinian insurance sector showed that DSS use significantly enhanced crisis management across all stages—early warning, prevention, damage containment, and recovery. Despite these promising outcomes, other studies such as (Maha, 2011) have highlighted persistent challenges related to limited technological infrastructure, insufficient managerial support, human resource constraints, and poor integration between information systems.

Despite the growing interest in this field, there remains a notable research gap concerning the integration and effectiveness of DSS within insurance companies in developing economies, particularly in North Africa, including Algeria. This gap justifies the focus of the present study on Algerian insurance institutions and underscores its contribution to both theoretical understanding and practical application.

Research Structure: To comprehensively address the various aspects of the study and provide a solution to the research problem, the study is divided into two main parts. The first part focuses on the theoretical framework, covering the general concepts and foundations of Decision Support Systems. The second part addresses the methodological framework, detailing the stages of the case study, the data collection process, and the analysis of the results.

2. Theoretical Background:

This section provides the theoretical foundations necessary for understanding the key concepts addressed in this research. It explains the main principles related to decision support systems and highlights their importance in organizational contexts. By establishing this conceptual foundation, the research ensures a clearer interpretation of the subsequent analytical and empirical discussions.

2.1. Definition of Decision Support Systems

The concept of Decision Support Systems (DSS) is relatively recent, and as such, there is no standard definition. However, due to the large number of specialists currently working in this field, several definitions have been proposed.

One widely cited definition describes DSS as an integrated set of software applications, pre-built packages, or processing tools that interact with data and information to facilitate the generation of proposed solutions. These systems can combine multiple models to create a comprehensive framework that enables the decision-maker to interact directly with the system and access information useful for addressing semi-structured and unstructured decision-making problems. (Bashir & Atef, 2021, p. 230)

Another definition views Decision Support Systems (DSS) as a type of Management Information System designed to assist decision-makers by integrating data with mathematical and analytical models, enabling them to address semi-structured and unstructured problems. These systems aim to enhance the effectiveness of the decision-making process by providing relevant information, facilitating the evaluation of alternatives, and helping decision-makers select the most appropriate solution through an interactive, computer-based environment. (Peignot et al, 2013, p. 95)

From these definitions, it can be concluded that Decision Support Systems (DSS) are integrated systems designed to provide decision-makers with the necessary support in addressing a wide range of problems—whether structured, semi-structured, or unstructured. They achieve this by incorporating mathematical and analytical models into a unified framework that enables decision-makers to conduct simulations, interact directly with the system, and use various applications that contribute to enhancing the effectiveness of the decision-making process.

2.2. Application domains of decision support systems:

The use of Decision Support Systems (DSS) has expanded significantly due to their importance in improving the quality of managerial decisions. However, the scope of their application varies from one organization to another depending on the nature of activities, the complexity of the problems faced, and the availability of technological infrastructure. Among the key areas where DSS are commonly applied are: (Muhammad, 2022, p. 68)

- Policy analysis and strategic direction setting in governmental organizations.
- Strategic planning and performance evaluation.
- Strategic financial planning and budgeting.
- Investment portfolio management and financial decision analysis.
- Geographic information analysis and resource allocation.
- Production and operations management.
- Supply chain planning and optimization.
- Risk identification, assessment, and mitigation.

2.3. Components of decision support systems:

a. Management Data Sub-system: It represents a set of interconnected programs responsible for performing various operations on data, including queries, updating, storing, retrieving, and processing. This component also contributes to generating reports and extracting information in a manner that enhances the decision-making process. Moreover, it links data with the model-base in order to build an integrated environment that supports analytical tasks. Through this component, a large number of users can access and interact with the database efficiently and securely. (Abdul-Aziz, 2018, p. 51)

b. Model Management Sub -system: It is composed of software that develops models and employs modular components to expand capabilities, modify or update data, and process information through a set of pre-designed programs intended to address various problems across different business domains. This system includes a model base management system and a model dictionary, in addition to a model base that contains a collection of mathematical and statistical models (El-Tantawy, 2022, p. 525). The most important of these are: (Abdul-Aziz, 2018, p. 52)

- **What-if analysis tools:** These tools evaluate how changes in specific input variables influence the resulting outputs.
- **Statistical analysis tools:** These include methods such as mean, standard deviation, and variance to support data-driven decision-making.
- **Sensitivity analysis:** A specialized form of what-if analysis in which only one variable is altered repeatedly while monitoring the resulting outcomes. It is particularly useful when the decision maker is uncertain about the assumptions made regarding the values of key variables.

- **Goal seeking:** A technique that determines the necessary input values to achieve a desired output level. It works by adjusting variables iteratively until the target output is reached.
- **Optimization analysis:** An advanced form of goal-seeking analysis used to identify the optimal value of a variable under specific constraints, iteratively adjusting the variables until the most favorable outcome is achieved.

c. Interface User Sub –system: It serves as an interface that manages the interaction between the decision maker and the decision support system, allowing commands to be entered and information to be retrieved and analyzed through the model base. To function effectively, this interface must be simple, intuitive, and sufficiently flexible for the decision maker. The interaction between the decision maker and the decision support system may occur directly through command entry via the interface, or indirectly through various additional methods, including:

- Selection lists: These are commonly used in graphical user interfaces, allowing the decision maker to choose from predefined options.
- Tables and dialog boxes: Data can be entered through structured tables or specific dialog boxes designed to facilitate accurate input.
- Question-and-answer interaction: The system prompts the decision maker with a sequence of questions, and the responses guide the generation of results or outputs.
- Input/output forms: The system presents a structured input form where the decision maker provides the required data. Based on the entered information, the system produces the corresponding output in a similar formatted form.

The interaction may also occur indirectly through intermediaries, such as periodic or scheduled reports, or with the assistance of organizational staff (operators) responsible for generating these reports. In some cases, a specialized analyst may support the process by producing analytical outputs, interpreting the results, and proposing recommendations. The system's outputs may be presented in the form of structured reports or graphical representations. (Abdul-Aziz, 2018, p. 53)

2.4.Decision-making support methods:

These methods consist of software applications that provide decision makers with the information required to address complex problems that are difficult to resolve using traditional approaches. With the development of information technologies, several analytical tools have emerged to strengthen organizational decision support capability.

a. Data Warehouses: The data warehouse is considered a modern concept and refers to a software-based system designed to support decision-making processes. It comprises a collection of accurate and integrated data, both historical and dynamically changing over time, which facilitates informed decision-making. A data warehouse is populated from multiple operational databases through the preparation and processing of data during transfer, ensuring the required level of integration (Inmon, 2002, p. 31). Specifically, data warehouses are engineered to extract, process, and present information in formats suitable for time-series analysis, knowledge discovery, and decision support, as they manage vast amounts of data (measured in terabytes) sourced from heterogeneous systems (Abdullah, 2009, p. 179)

b. Data Mining: Data mining encompasses techniques, models, methods, tasks, and algorithms employed to analyze large volumes of data stored across diverse sources, with the objective of discovering patterns, rules, and models. It is considered a critical step in the process of Knowledge Discovery in Databases (KDD), serving as a mechanism to analyze and summarize extensive datasets to extract the knowledge they contain (Ramou & Al-Naimi, 2021, p. 340). Data mining techniques are designed to provide rapid answers to complex questions, generate predictions, and uncover behaviors and trends, thereby enabling decision makers to make timely and informed decisions (Jawad, 2011, p. 37).

Furthermore, data mining offers a suite of techniques and software tools for database research to extract relevant information or knowledge, including Time Series Analysis, Classification, Prediction, Clustering, and Rule Analysis.

c. **On-Line Analytic Processes (OLAP)**: One of the most important tools for supporting decision-making, Online Analytical Processing (OLAP) is software that queries and presents both textual and numerical data from data warehouses or data marts, performing analyses based on multidimensional models on large datasets (Alberto & Oscar, 2017, p. 1). OLAP tools enable decision makers to execute queries and obtain detailed or summary reports, compare performance across multiple factors, identify trends, and make predictions by analyzing data from multiple perspectives. This is achieved by organizing the data into a multidimensional structure, metaphorically referred to as a data cube, where each dimension represents a distinct aspect of the data and contains a set of numerical measures representing performance indicators.

OLAP provides an environment that facilitates data analysis by applying a set of operations on the data cube, yielding analytical insights from multiple angles (Saadallah & Asim, 2014, p. 159). These operations allow the original query to be transformed into new queries through functions such as Selection (Dice), Roll-up, Drill-down, Change Base, Drill-across, and Set Operations.

d. **Artificial intelligence tools**: Artificial intelligence (AI) has increasingly emerged as an important extension of Decision Support Systems (DSS), enhancing organizational data-processing capabilities and improving the quality of managerial decision-making. Among the most prominent AI-based tools are machine learning and deep learning techniques. Machine learning (ML) relies on algorithms trained on historical data to identify hidden patterns, discover relationships among variables, and generate predictive insights, thereby supporting evidence-based decision-making in complex organizational environments (Goodfellow et al, 2016; p. 96 ; Sharda et al, 2020, p. 291). Building upon these capabilities, deep learning represents a more advanced subset of machine learning that employs multi-layered neural networks to process large-scale and unstructured data with higher analytical precision, enabling the extraction of complex patterns and improving predictive accuracy (Goodfellow et al, 2016, p. 483; Taima, 2022, p. 288; Al-Akour, 2024, p. 07). Despite their growing strategic importance as next-generation decision-support technologies, their practical integration in developing organizational contexts remains limited due to infrastructural constraints, computational requirements, and the limited availability of large-scale datasets necessary for effective model training. Consequently, in sectors such as insurance, traditional DSS tools continue to dominate managerial decision-support practices.

3. Field Study

To evaluate the extent to which Algerian insurance companies have integrated decision support systems, a structured questionnaire was administered, and the collected data were analyzed using the statistical package SPSS. This approach enabled the acquisition of empirical information and its statistical processing to derive objective and reliable results.

3.1. Insurance sector in Algeria:

The insurance sector in Algeria encompasses a diverse array of companies, which can be classified according to two primary criteria. The first criterion pertains to capital structure, with Law No. 95-07, amended by Law No. 06-04, distinguishing among state-owned public insurance companies, privately owned companies, mixed companies combining public and private capital, and mutual companies, which operate on a cooperative basis and are non-profit. The second criterion relates to the type of insurance products offered, dividing companies into two main categories: non-life insurance, which includes property and liability coverage, and life insurance, encompassing life, personal accident, and health insurance.

Table 1: Insurance companies in Algeria

	Public companies	Private companies	Mixed companies	Cooperatives
Damage insurance	-National Insurance Company (SAA) -Algerian Insurance Company (CAAT) -Fuel Insurance Company (CASH) -Algerian Insurance and Reinsurance Company (CAAR) -Mortgage Guarantee Company (SGCI) -Algerian Export Insurance and Guarantee Company CAGEX -Al-Takaful Algeria	-International Insurance and Reinsurance Company CIAR -Trust Assurances Algeria -ALLIANCE assurances -Salama Insurance -Gulf Insurance Group GIG -GAM Insurance	AXA - DAMAGES	-National Agricultural Mutual Insurance Fund CNMA -Algerian Mutual Insurance Company for Education and Culture Workers Maatec
Personal Insurance	-CAARAMA INSURANCE -TALA INSURANCE	- CARDIF EL DJAZAIR - MASIR VIE	-AXA ALGERIA - AMANA Insurance -Algerian Life Insurance AGLIC	/

Source: Author based on the 2022 report of the National Insurance Council (CNA).

This overview demonstrates that the Algerian insurance sector is marked by significant diversity, encompassing both public and private entities operating in property and liability insurance as well as personal insurance, within an environment that is becoming increasingly competitive. To sustain their presence and ensure long-term continuity, insurance companies strive to reinforce their competitive position by enhancing service quality, expanding and diversifying their insurance offers, and responding more effectively to evolving market needs. In parallel, they focus on improving managerial performance and raising the quality of decision-making processes, with the ultimate goal of achieving greater organizational efficiency.

3.2.Questionnaire design:

By reviewing a set of questionnaires designed in previous studies, a questionnaire was prepared that meets the requirements and objectives of the study. Its components are explained below:

- **First Axis: General Data:** This axis aims to collect information related to the characteristics of the study sample. It includes four key variables: job position, educational attainment, age, and years of professional experience.
- **Second Axis: The Decision-Making Process in Insurance Companies**: This axis aims to assess the efficiency of decision-making within insurance companies and the methods they employ, using a set of 15 statements. These include a statement designed to identify the type of information systems integrated by the companies, another to determine the sources of information on which decisions are based, and additional statements intended to explore the decision-making methods in use.

Given that the efficiency of the decision-making process depends on the availability of accurate and timely information at its various stages—and that its success is evaluated based on the extent to which decisions contribute to achieving corporate objectives and enhancing the organization's capacity to respond to environmental changes—the remaining questionnaire items were organized into two dimensions. The first dimension examines the extent to which the systems in place are capable of providing the information required throughout the stages of decision-making. The second dimension evaluates the efficiency of the decisions taken, particularly in terms of their contribution to achieving the company's diverse objectives.

3.3. Accuracy and consistency of the study tool:

- **Apparent Validity**: to ensure the apparent validity of the study instrument, a panel of academic experts specializing in the field reviewed the questionnaire. Their feedback and suggested revisions were carefully incorporated. Following this refinement process, the questionnaire was finalized in its current form and subsequently administered to the targeted sample.
- **Internal Consistency of the Measurement Dimensions:** Internal consistency was assessed by calculating Pearson correlation coefficients between each dimension and the overall questionnaire score. The obtained coefficients indicate significant positive associations, confirming acceptable coherence between the dimensions and the overall measurement instrument.The results, presented in the subsequent table:

Table 2: Results of the correlation coefficient between dimensions and overall score

Dimensions	Correlation coefficient	Significance level
First dimension: Availability of information	0.726	**0.001**
Second dimension: Decision efficiency	0.840	**0.001**

Source: Author based on the outputs of the SpssV26.

Table 2 presents the Pearson correlation coefficients calculated between each questionnaire dimension and the overall instrument score in order to assess the internal consistency of the measurement dimensions. The first dimension recorded a correlation coefficient of (0.726), while the second dimension recorded a coefficient of (0.840). Both values exceed the commonly accepted threshold of (0.70), indicating a satisfactory level of internal consistency across the questionnaire dimensions. In addition, all correlation coefficients were statistically significant, as their associated significance values (Sig.) were below the adopted significance level (0.05), reflecting strong and statistically meaningful associations between each dimension and the overall measurement instrument.

These results provide preliminary evidence of internal coherence among the questionnaire dimensions and support the consistency of the measurement scale.

- **Testing the validity of the study tool using the Alpha Cronbach coefficient:** The Cronbach's alpha test was used to determine the degree of stability of the scale dimensions. The following table shows the test results:

*Table 3: Results of the stability coefficient *Alpha Cronbach * for the study tool*

Axis	Test value	Measurement level
First dimension: Availability of information	0.959	**Excellent**
Second dimension: Decision efficiency	0.958	**Excellent**
overall questionnaire	**0.960**	**Excellent**

Source: Author based on the outputs of the SpssV26.

Based on the results presented in Table 3, the reliability coefficients recorded for each dimension indicate robust internal consistency across the measurement dimensions, reflecting a strong level of reliability. Moreover, the overall Cronbach's alpha coefficient of the questionnaire reached (0.960), indicating a high level of scale reliability and confirming the stability of the measurement instrument. These findings suggest that the questionnaire provides a reliable basis for data collection and supports the consistency of the empirical analysis undertaken in this study.

3.4.Study population and sample:

- **Target Population:** The target population of this study consists of Algerian insurance companies, totaling 22 public, private, and mixed-capital entities operating in both property and casualty insurance as well as life and personal insurance.
- **Statistical Population:** The statistical population includes managers working within Algerian insurance companies, whose responsibilities involve decision-making or participation in decision-making processes at different administrative levels.
- **Study Sample:** Due to the large size of the population and the practical constraints related to time, geographic dispersion, and available resources, a purposive sampling technique was adopted. The final sample consisted of 201 executives involved in decision-making across 19 insurance companies. Among these companies, 14 operate in the property and casualty insurance sector, while 5 operate in the life insurance sector.
- **Sample Characteristics:** The sample is defined by several demographic and professional characteristics, which are presented in the following table:

Table 4: Characteristics of the study sample

Variable		Frequencies	Percentages %
Job level	Director	47	23,4
	Head of department	42	20,9
	Head of service	43	21,4
	Head of section	25	12,4
	Technical staff	25	12,4
	Commercial staff	3	1,5
	Deputy manager	3	1,5
	Research offir	8	4,0
	Department manager	1	0,5
	Deputy head of service	4	2,0
Level of education	Baccalaureate	10	5,0
	Bachelor's degree or equivalent	69	34,3
	Master's degree or equivalent	106	52,7
	Doctorate or equivalent	8	4,0
	Senior technician	3	1,5
	State engineer	5	2,5
Age	Under 30 years old	15	7,5
	30 to under 40 years old	99	49,3
	40 to under 50 years old	74	36,8
	50 years old and above	13	6,5
Years of experience	Less than 5 years	31	15,4
	From 5 to less than 10 years	40	19,9
	From 10 to less than 15 years	55	27,4
	15 years or more	75	37,3

Source: Author based on the outputs of the SpssV26.

Representing approximately two-thirds of the sample. This composition enhances the credibility of the obtained responses, given their active involvement in decision-making processes.
With respect to educational attainment, more than half of the respondents (52.7%) hold a Master's degree or its equivalent, followed by Bachelor's degree holders (34.3%), which reflects the generally high academic qualification level within the insurance sector.
In terms of age and professional experience, the dominant age group ranges from 30 to under 40 years (49.3%), followed by those aged 40 to under 50 years (36.8%). These distributions align with the years of experience variable, where individuals with more than 15 years of experience constitute the highest percentage (37.3%). This suggests that the majority of participants possess substantial professional expertise and practical exposure within the insurance industry.

Overall, these characteristics indicate that the sample is composed of qualified and experienced personnel, which reinforces the robustness and validity of the study's findings concerning decision-making practices in Algerian insurance companies.

3.5.Data analysis: After distributing the questionnaire to the study sample, the responses of the sample members to the questionnaire items showed the following:

a. Description of the variable system integrated by the company:

This variable is based on multiple answers, where the following table can illustrate the choices of the sample studied:

Table 5: Description of the system variable integrated by the company in the management of its functions

Variables	N	Percentage	Percentage for each segment
A set of information systems to manage each function separately	100	42.9%	49.8%
Enterprise Resource Planning (ERP-PGI)	93	39.9%	46.3%
Information systems that aid decision-making	40	17.2%	19.9%
Total	**233**	**100.0%**	**115.9%**

Source: Author based on the outputs of the SpssV26.

Table 5 indicates that the majority of insurance companies in Algeria rely on function-specific information systems (42.9%), reflecting a traditional organizational approach in which each department operates an independent system. In comparison, approximately (39.9%) of companies have integrated Enterprise resource planning (ERP/PGI), which suggests a growing orientation toward system modernization and operational integration aimed at enhancing efficiency and aligning with technological developments.

The integration of dedicated decision support systems remains limited to (17.2%), which may be attributed to insufficient awareness of their strategic value or the high financial and technical requirements associated with implementing such systems.

Overall, the findings reveal that Algerian insurance companies are in a transitional phase, gradually shifting from isolated legacy systems toward more integrated solutions. However, the integration of decision support systems remains relatively underdeveloped, underscoring the need for greater investment in such technologies to strengthen decision-making effectiveness within an increasingly competitive environment.

b. Description of the variable for access to information required for decision-making:

Companies, where members of the study sample can choose more than one option. The sample responses are illustrated in the following table:

Table 6: Description of variables for obtaining information necessary for decision-making

Variables	N	Percentage	Percentage for each segment
Decision-maker's expertise and experience	73	24.1%	36.9%
Establishment of specialized committees or appointment of staff to gather information	116	38.3%	58.6%
Reliance on information systems	114	37.6%	57.6%
Total	**303**	**100%**	**153%**

Source: Author based on the outputs of the SpssV26.

Table 6 indicates that reliance on specialized committees or staff responsible for information gathering ranked first at (38.3%), reflecting the substantial importance assigned to collecting information in a systematic and organized manner to support well-informed decision-making. This was followed by reliance on information systems at (37.6%), underscoring the central role these

systems play in providing decision-makers with accurate and up-to-date information. Reliance on the experience and professional judgment of decision-makers ranked third at (24.1%), which highlights the continued confidence in personal expertise and accumulated practical knowledge within the companies under study.

Overall, these findings reveal that Algerian insurance companies tend to integrate both human and technological resources in their decision-making processes. This demonstrates a growing recognition of the need for accurate, timely, and diversified information to make sound decisions in an increasingly dynamic business environment. It also reflects a clear orientation toward strengthening and modernizing information systems in line with contemporary technological requirements.

c. Description of the first dimension: Availability of information: This dimension aims to determine the availability of information necessary for decision-making within the company. The responses of the study sample to the statements of this dimension were as follows:

Table 7: Description of information-availability dimension statements

Items	Arithmetic mean	Standard deviation	Relative weight
First dimension: Availability of information	**3,713**	**0,50947**	**Agreed**
1. The approved systems provide the information necessary for the decision-making process.	4,06	0,661	Agreed
2. The approved systems provide information that helps identify the problem.	3,93	0,728	Agreed
3. The approved systems help find and develop alternatives to solve the problem.	3,86	0,772	Agreed
4. The approved systems provide software that helps evaluate the available alternatives.	3,76	0,841	Agreed
5. The approved systems help disseminate and circulate instructions for implementing the decision.	3,77	0,907	Agreed
6. The approved systems help follow up on implementation procedures.	3,86	0,808	Agreed

Source: Author based on the outputs of the SpssV26.

Table 7 shows that the responses of the study sample to the items of the first dimension yielded a mean score of (3.713), indicating a relative weight tending toward agreement, with a standard deviation of (0.509), which reflects a degree of consensus among respondents regarding the statements of this dimension as a whole.

Statement (1) recorded the highest level of agreement, with a mean of (4.06), confirming that the systems integrated by the companies under study provide the essential information on which various decisions are based. This supports the organizations' ability to make appropriate decisions in addressing the different problems they encounter.

Statements (2)–(6), which relate to the extent to which respondents' information systems support the various stages of the decision-making process—from problem identification to monitoring the implementation of decisions—recorded similar mean values, ranging from 3.77 to 3.93, indicating a general tendency toward agreement. This suggests that the information provided by these systems contributes consistently and directly to all phases of decision-making.

Regarding the standard deviation, values ranged between (0.907) and (0.661), reflecting a moderate degree of variability in the respondents' perceptions. This indicates some divergence of views regarding the extent to which the information required for decision-making is available, despite the overall agreement observed.

d. Description of Decision-Making Method Variable: This variable represents the methods used in the insurance sector for decision-making, where individuals in the sample studied can choose more than one answer, as shown in the following:

Table 8: Description of variable in decision-making methods

Variables	N	Percentage	Percentage for each segment
Scientific methods (operations research, probability, decision trees, etc.)	96	29.4%	49.0%
Individual methods (experience and expertise, personal judgment, etc.)	87	26.7%	44.4%
Participatory methods (brainstorming, opinion polls, etc.)	84	25.8%	42.9%
Specialized software to support decision-making	59	18.1%	30.1%
Total	**326**	**100.0%**	**166.3%**

Source: Author based on the outputs of the SpssV26.

Table 8 shows that Algerian insurance companies rely on a diverse set of decision-making methods that integrate scientific approaches, practical expertise, and collective participation, while the use of advanced technological tools remains relatively limited. Scientific methods -such as operations research, decision trees, and probability analyses-accounted for (29.4%), reflecting a clear tendency toward decision-making grounded in quantitative and logical analysis. These were followed by individual methods based on experience and expertise at (26.7%), confirming that the human factor and accumulated practical knowledge continue to play a substantial role in a context often marked by uncertainty.

Participatory methods, including brainstorming and opinion polls, represented (25.8%), indicating the prevalence of a teamwork-oriented culture and the involvement of employees in the decision-making process. In contrast, the use of specialized decision support software ranked lowest at (18.1%), highlighting a relatively limited integration of advanced digital solutions within the sector.

Overall, the results suggest that Algerian insurance companies are in a transitional phase that blends traditional practices with more scientific approaches. However, there remains a pressing need to expand the use of digital tools and decision support systems to enhance the efficiency, transparency, and objectivity of decision-making, particularly given the rapid technological transformations shaping the contemporary business environment.

e. Description of the second dimension: Decision-making efficiency:

This dimension aimed to assess the effectiveness of the decisions made within the companies in achieving the predetermined objectives. The responses of the study sample to the items included in this dimension were as follows:

Table 9: Description of decision efficiency dimension statements

Items	Arithmetic mean	Standard deviation	Relative weight
Second dimension: Decision efficiency	**3,9670**	**0,53504**	**Agreed**
Decisions within the company are influenced by the evolution of the management information system integrated.	3,86	0,845	Agreed
The decisions made contribute to the maximum achievement of the specified objectives.	4,11	0,702	Agreed
The decisions made contribute to solving various problems facing the company.	4,08	0,752	Agreed
The systems integrated help increase the efficiency of the decision-making process.	4,01	0,707	Agreed
The systems integrated contribute to increasing the accuracy and quality of the decisions made.	3,99	0,696	Agreed
The systems integrated reduce reliance on experience, intuition, etc. in decision-making.	3,76	0,822	Agreed

Source: Author based on the outputs of the SpssV26.

Through Table 9, it is noted that the responses of the surveyed sample regarding the statements of the second dimension resulted in an overall mean of (3.967)**,** corresponding to a

relative weight of "agree", with a standard deviation of (0.53504**).** This indicates a high level of consensus among respondents regarding the statements related to this variable as a whole.
Regarding individual statements, Statement (2) recorded the highest acceptance level, with a mean of (4.11)**,** confirming that the decisions made in the companies under study are generally effective in achieving the predetermined objectives. In contrast, Statement (7) recorded the lowest mean value, estimated at (3.76)**.** Although this value remains within the acceptable range, it suggests that reliance on information systems in the decision-making process within Algerian insurance companies does not necessarily eliminate the use of qualitative approaches based on the decision-maker's experience and judgment in solving problems.
As for the standard deviation, the values ranged between (0.845) and **(**0.696)**,** indicating a relative degree of variation in the respondents' answers concerning the statements related to decision efficiency. This variation reflects some differences in opinions among respondents regarding the effectiveness of decisions and their ability to achieve the various desired objectives.

4. Conclusion

By examining the current state of decision support systems in the Algerian insurance sector, the following can be concluded:

- There is a noticeable variation in the level of technology integrated by Algerian insurance companies. The majority rely on independent functional information systems, whereas the integration of dedicated decision support systems represents the smallest proportion, reflecting the limited prevalence of such systems within the sector.
- Algerian insurance companies are gradually moving toward the integration of modern technological solutions by integrating enterprise-wide systems into the management of their operations. However, the implementation of decision support systems remains limited due to high costs and insufficient managerial awareness regarding their strategic value.
- These companies Use multiple sources to obtain the information required for decision-making, combining technical and human resources in data collection. This reflects the awareness of the critical importance of having accurate and relevant information to support decision-making processes.
- The integrated information systems contribute effectively to providing the necessary information for decision-making, thereby supporting the various stages of the decision-making process and enhancing the accuracy and effectiveness of decisions in achieving the established objectives.
- Most Algerian insurance companies rely on a combination of decision-making methods, including traditional scientific methods (e.g., operations research, probability analysis), individual methods (experience and personal judgment), and participatory methods (e.g., brainstorming). In contrast, a minority of companies rely on specialized decision support software.
- Decision support systems contribute positively to enhancing the quality of decisions made in Algerian insurance companies; however, this impact remains limited due to the relatively low integration of these systems across the sector.
- Algerian insurance companies are undergoing a digital transformation, aiming to gradually develop and modernize their information systems. There is an urgent need to intensify efforts in technical training and capacity building, as well as to strengthen technological infrastructure, in order to increase the efficiency of decision support systems and further improve the effectiveness of decision-making processes.

5. Recommendations:

- Develop targeted managerial training programs to improve awareness of DSS strategic value, especially since only 17.2% of surveyed companies reported using dedicated DSS.

- Encourage phased integration of DSS modules into existing ERP systems, given that 39.9% of companies already rely on ERP platforms.
- Strengthen technological infrastructure to facilitate better data integration and improve the quality of decision-support information.
- Improve organizational coordination between departments to reduce fragmentation caused by function-specific information systems.
- Future studies should investigate sector-specific barriers such as implementation costs, integration complexity, and employee readiness for digital transformation.

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