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The impact of human ressources management digital tools on the effectiveness of internal communication Within organizations

Empirical Study: Sonatrach – Hassi R'Mel Complex Algeria

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I. Abstract

This study aims to identify the impact of digital tools on the quality of internal communication from the perspective of Sonatrach employees, particularly those working in the Human Resources Department at the Regional Directorate of Hassi R'mel. The study used a questionnaire as the main tool for data collection from a random sample consisting of 85 respondents out of a total population of 101 individuals. By adopting both descriptive and analytical approaches, and with the aim of processing data and analyzing various causal relationships, the proposed hypotheses were tested using the Statistical Package for the Social Sciences (SPSS).

After verifying the validity and quality of the proposed model, the study reached several important findings, the most significant of which are:

The study revealed the existence of a statistically significant effect between the dimensions of digital Human Resource Management tools and internal communication from the perspective of employees in the Human Resources Department of Sonatrach at Hassi R'mel, indicating the presence of an influence between the two variables;

The study also showed the absence of statistically significant differences in employees' opinions regarding the study variables (digital tools and internal communication) attributable to personal and professional factors.

Based on the findings, it is recommended that Sonatrach improve the integration of HR digital systems, enhance employees' digital skills through continuous training, and strengthen interactive digital communication to support better information flow, participation, and engagement.

Keywords: digitalization, digital tools, internal communication, Human Resource Management.

II. Résumé

Cette étude vise à identifier l'impact des outils numériques sur la qualité de la communication interne du point de vue des employés de l'entreprise Sonatrach, plus précisément ceux du département des ressources humaines de la direction régionale de Hassi R'mel. L'étude a utilisé le questionnaire comme principal outil de collecte des données auprès d'un échantillon aléatoire composé de 85 individus issus d'une population totale de 101 individus. En adoptant les méthodes descriptive et analytique, et dans le but de traiter les données et d'analyser les différentes relations causales, les hypothèses formulées ont été testées à l'aide du logiciel Statistical Package for the Social Sciences (SPSS).

Après avoir vérifié la validité et la qualité du modèle proposé, l'étude a abouti à plusieurs résultats, dont les plus importants sont les suivants :

L'étude a révélé l'existence d'un effet statistiquement significatif entre les dimensions des outils numériques de gestion des ressources humaines et la communication interne du point de vue des employés du département des ressources humaines de Sonatrach à Hassi R'mel, ce qui démontre l'existence d'une influence entre ces deux variables ;

Elle a également montré l'absence de différences statistiquement significatives dans les opinions des employés interrogés concernant les variables de l'étude (les outils numériques et la communication interne), attribuables aux facteurs personnels et professionnels.

Sur la base des résultats obtenus, il est recommandé à Sonatrach de renforcer l'intégration des systèmes numériques RH, de développer les compétences digitales des employés et d'améliorer la communication interactive afin d'assurer une meilleure circulation de l'information et de renforcer l'engagement des employés.

Mots-clés : la digitalisation, les outils numériques, la communication interne des ressources humaines.

III. ملخص

تهدف هذه الدراسة إلى التعرف على مدى تأثير الأدوات الرقمية على جودة الاتصال الداخلي من وجهة نظر موظفي مؤسسة سوناطراك وبالتحديد موظفي قسم الموارد البشرية بالمديرية الإقليمية بحاسي الرمل. كما استخدمت الدراسة الاستبانة كأداة رئيسية لجمع البيانات لعينة عشوائية مكونة من 85 فرد من مجتمع قدره 101 فرد، وباستخدام المنهج الوصفي والمنهج التحليلي، وبهدف معالجة البيانات وتحليل مختلف العلاقات السببية تم اختبار الفرضيات الموضوعة باستخدام برنامج الحزم الاحصائية الاجتماعية(SPSS) ، حيث خلصت الدراسة بعد التحقق من صلاحية وجودة النموذج المقترح إلى مجموعة من النتائج أهمها:

أظهرت وجود أثر دال إحصائيا بين أبعاد الأدوات الرقمية لإدارة الموارد البشرية والاتصال الداخلي من وجهة نظر موظفي قسم الموارد البشرية لمؤسسة سوناطراك بحاسي الرمل مما يدل على وجود تأثير بينهما؛ كما أظهرت عدم وجود فروقات ذات دلالة إحصائية حول آراء الموظفين المستجوبين تجاه متغيرات الدراسة (الأدوات الرقمية والاتصال الداخلي)، تعزى للعوامل الشخصية والوظيفية.

وبناءً على النتائج المتوصل إليها، يمكن اقتراح مجموعة من التوصيات لمؤسسة سوناطراك، تتمثل في تعزيز تكامل الأنظمة الرقمية للموارد البشرية لضمان انسيابية تدفق المعلومات، ودعم المهارات الرقمية عبر برامج تدريبية مستمرة، إضافة إلى تطوير آليات الاتصال التفاعلي داخل المنصات الرقمية بما يعزز مشاركة الموظفين وانخراطهم.

الكلمات المفتاحية: الرقمنة، الأدوات الرقمية، الاتصال الداخلي، الموارد البشرية.

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TABLE OF ABRIVIATIONS

AI: Artificial Intelligence

CTH: Oil Treatment Center

CSTF: Central Storage and Transfer Facility

E-HRM: Electronic Human Resources Management

FM: Flowthing Model

GTC: Gas Treatment Center

HR: Human Resources

HRM: Human Resources Management

HRIS: Human Resources Information Systems

MFA: Multi Factor Athentification

MPP: Model Processing Plan

NEC: Network Enable

SRGA: Associated Gas Recovery Station

SCNR, SCS: Compression Station (North and south)

SAP: Systems Applications and Products in data Processing

TAM: Technology Acceptancy Model

UTAUT: Unified Theory of Acceptance and use of Technology

WMM: westly and Maclean Model

GENERAL INTRODUCTION

GENERAL INTRODUCTION

Digitalization and internal communication are two interrelated factors that are now very important for modern human resource management to work well. Digitalization, as an organizational phenomenon, pertains to the incorporation of digital technologies into managerial and operational processes, especially within Human resources (HR) functions such as communication, coordination, and employee interaction. (Dessler, 2020) says that digital technologies help HR departments handle information better and keep communication going between management and employees. In this situation, digitalization is a major force behind changes in how HR tasks are planned and carried out.

On the other hand, internal communication is an important part of human resource management that makes sure that information flows, everyone understands the company's goals, and employees and management are on the same page. (Men & Bowen, 2016) contend that proficient internal communication fosters employee engagement, trust, and organizational commitment. In Human Resources Management (HRM), internal communication is important because it helps employees get involved, be open, and make decisions.

With the rise of digital HRM, the link between these two variables has become more and more important. In Human Resource Management in the Digital Age, (Bondarouk & Ruël, 2019) say that digitalization changes internal communication from one-way messaging to interactive exchanges that use technology. HR departments can quickly share information, get feedback, and encourage collaboration across all levels of the organization thanks to digital platforms, HR information systems, and online communication tools.

In addition, (Towers,Watson, 2014) says in The Next Generation of Employee Communication that digital communication tools make messages more consistent, employees more engaged, and responses faster. (Parry & Strohmeier, 2014) warn, though, that digital internal communication only works well if digital tools are well integrated into HR practices and the culture of the organization.

Consequently, digitalization serves as the independent variable that influences communication processes, whereas internal communication within human resource

management constitutes the dependent variable affected by digital tools and systems. To figure out how digital transformation helps HR communication, you need to know how these two variables work together. This research examines the influence of digitalization on internal communication within human resource management, employing a quantitative methodology to analyse this relationship.

Choice and Interest of the Topic

We chose this topic because it addresses a current and important issue in the development of modern organizations: the impact of digital HRM tools on the effectiveness of internal communication. With the continuous growth of digital transformation, organizations are increasingly adopting digital technologies in Human Resource Management, which makes it necessary to examine how these tools influence communication processes within organizations.

This topic is also related to our specialization in Management of Organizations, while focusing on a field that combines managerial practices with technological innovation, both of which have become essential for improving organizational performance and employee interaction.

Moreover, the limited number of academic studies dealing with this issue, particularly in the Algerian context, motivated us to contribute to a better understanding of the role of digital HRM tools in enhancing the effectiveness of internal communication and supporting organizational efficiency, especially within Sonatrach.

Objectives Of the Study

The main objective of this study is to examine the impact of digitalization on internal communication in human resource management.

And more specifically, the study aims to:

- Analyse the role of digital tools in facilitating internal communication within HRM
- Examine the relationship between digitalization and the effectiveness of internal HR communication

- Identify the influence of digital communication on employee engagement and information flow
- Assess employees' perceptions of digital internal communication practices

Significance of the Study

This study is significant at both academic and practical levels. Academically, it contributes to the growing body of literature on digital HRM and internal communication by empirically examining their relationship. While previous studies such as (Marler & Fisher, 2013) and (Strohmeie, 2020) have addressed digital HR systems, fewer studies focus specifically on their impact on internal communication within HRM.

Practically, the findings of this study may help HR managers and organizational leaders better understand how digitalization can be used to improve internal communication strategies. Insights from this research can support organizations in designing more effective digital communication systems that enhance employee engagement, transparency, and organizational performance.

Problematic

The rapid development of digital technologies has significantly transformed organizational practices, particularly in Human Resource Management (HRM). Organizations increasingly use digital tools such as Human Resource Information Systems (HRIS), digital platforms, and communication technologies to manage HR processes and facilitate communication between employees and management, improving the speed and accessibility of internal communication. However, despite the growing adoption of these technologies, it remains unclear to what extent digitalization effectively enhances internal communication, as challenges related to technology adoption and communication quality may still affect its effectiveness. Therefore, this research aims to examine the impact of digitalization on internal communication in human resource management and to determine whether digital technologies improve communication between HR departments and employees.

In this context, the present research seeks to examine the impact of digitalization on internal communication in human resource management. Accordingly, this study is organized around the following main research question:

What is the impact of Digital tools on internal communication in human resource management at Sonatrach Hassi R'mel?

To further explore this issue, several sub-questions are formulated in order to deepen the analysis:

Sub-Questions

• Q1: How does Digital tools influence communication processes within HR departments at Sonatrach Hassi R'mel?

• Q2: What role do digital communication tools play in improving internal communication at Sonatrach Hassi R'mel?

• Q3: Does Digital tools enhance employee participation and engagement in internal communication at Sonatrach Hassi R'mel?

• Q4: How effective are digital HR systems in facilitating communication between employees and management at Sonatrach Hassi R'mel?

- Q5: Are there statistically significant differences in respondents' perceptions of the study variables attributable to the personal and occupational characteristics of the study sample at Sonatrach – Hassi R'mel?

HYPOTHESIS

Main Hypothesis (H1)

(H1): Digital HRM tools have a significant positive effect on internal communication effectiveness at Sonatrach Hassi R'mel.

Sub-Hypotheses

- H1a: The operational dimension of digital HRM tools positively affects internal communication quality and employee engagement at Sonatrach Hassi R'mel.

- H1b: The strategic dimension of digital HRM tools positively affects internal communication quality and employee engagement at Sonatrach Hassi R'mel.
- H1c: The experiential dimension of digital HRM tools positively affects two- way internal communication and interaction at Sonatrach Hassi R'mel.
- H1d: The technical and security dimension of digital HRM tools positively affects transparency, organizational trust and internal communication at Sonatrach Hassi R'mel t.

Research Methodology

This study adopts a quantitative research method to examine the relationship between digitalization and internal communication in human resource management. Quantitative research is appropriate as it allows for the measurement of variables and the statistical testing of hypotheses (Creswell, 2018)

Data will be collected using a structured questionnaire distributed to employees. The questionnaire will measure perceptions of digitalization practices and internal communication effectiveness. The collected data will be analysed using statistical techniques to test the proposed hypotheses and determine the strength and direction of relationships between variables.

Research Plan

This research is organized into three main chapters. The introduction presents the research context, problem statement, objectives, and hypotheses related to the impact of digital HRM tools on internal communication effectiveness.

The first chapter provides the theoretical and conceptual framework, addressing the main concepts, relevant literature, and theoretical foundations of the study. The second chapter outlines the methodological framework and the empirical study conducted at Sonatrach Hassi R'Mel, including the research approach, data collection methods, sampling procedures, and questionnaire design. The third chapter focuses on the statistical analysis and interpretation of the findings in relation to the research hypotheses and previous studies.

Finally, the conclusion highlights the main findings, presents practical recommendations, and proposes directions for future research.

CHAPTER 01:

LITERATURE REVIEW AND THEORETICAL AND CONCEPTUAL FRAMEWORK

Preamble

This chapter provides a comprehensive foundation for understanding the relationship between digital Human Resource Management (HRM) tools and internal communication effectiveness. It is structured around three complementary sections. The first section reviews the relevant literature in order to identify the main contributions of previous studies and highlight existing research gaps. The second section presents the theoretical framework by examining key theories that explain communication processes and technology adoption within organizations. The third section develops the conceptual framework by defining the main variables of the study and clarifying the relationship between digital HRM tools and the effectiveness of internal communication. This structure ensures a coherent analytical basis for the empirical investigation.

SECTION 01: LITERATURE REVIEW

This section is organized around two essential dimensions. The first focuses on reviewing previous studies related to the topic in order to establish the theoretical foundations of the research. The second presents the conceptual framework of the study through the clarification of the main concepts and the relationship between digital Human Resource Management (HRM) tools and the effectiveness of internal communication.

1. Digital Transformation and Human Resource Management

In the research paper Human Resource Management by (Dessler, 2020) the author explains the impact of digital technologies on modern Human Resource Management practices. Using a descriptive and pedagogical approach, the study demonstrates that modern HR departments increasingly rely on digital technologies to improve organizational processes, increase transparency, and strengthen employee engagement. The author also shows that digital tools facilitate communication between HR departments and employees while improving the speed and accessibility of information.

Similarly, in the research Human Resource Management at Work, (Marchington & Wilkinson, 2018) analyze the evolution of HR practices in response to technological and organizational transformations. Using analytical and comparative methods, the authors conclude that digital communication platforms facilitate employee participation and involvement, particularly when these systems are aligned with organizational culture. The study also highlights that digital communication contributes to improving collaboration and strengthening organizational integration.

In the research Human Resource Management in the Digital Age, (Bondarouk & Ruël, 2019) define Digital HRM as the use of digital tools to implement HR strategies, policies, and practices. Through conceptual analysis and case-based evidence, the authors demonstrate that digitalization improves internal communication by facilitating real-time interaction, increasing transparency, and improving accessibility to HR information. The study further explains that Digital HRM transforms communication from a unidirectional flow into a multidirectional and collaborative process.

Likewise, in their research paper published in The International Journal of Human Resource Management, (Bondarouk & Ruël, 2019) seek to establish a theoretical basis for research in digital HRM. Through literature synthesis, the authors conclude that Digital HRM converts

organizational communication into a collaborative and interactive process that enhances employee participation and communication effectiveness.

In the book Digital Human Resource Management: A Conceptual Clarification, (Strohmeie, 2020) differentiates Digital HRM from traditional HRM and electronic HRM (e-HRM). Using a systematic conceptual approach, the study demonstrates that Digital HRM integrates advanced technologies such as analytics, Artificial Intelligence (AI), and digital platforms, which significantly improve communication speed, accuracy, and personalization within organizations.

In the research paper An Evidence-Based Review of e-HRM, published in The International Journal of Human Resource Management, (Marler & Fisher, 2013) review empirical studies on e-HRM implementation. Through a systematic literature review, the authors conclude that e-HRM improves communication efficiency by reducing administrative burdens and facilitating access to information.

Similarly, in the research paper HRM in the Digital Age – Digital Changes and Challenges, published in Human Resource Management Review, (Parry & Strohmeier, 2014) identify the main digital challenges facing HRM. Through conceptual analysis, the authors explain that digitalization requires HR professionals to develop new communication skills in order to manage digital communication channels and virtual interactions effectively.

2. Internal Communication in Organizations

In the research paper Excellence in Internal Communication Management, published in Business Horizons, (Men & Bowen, 2017) explain that effective internal communication depends on transparency, open dialogue, and leadership support. Through theoretical modeling and practical examples, the authors demonstrate that digital communication tools strengthen communication quality and improve interaction between employees and management.

Likewise, in The Next Generation of Employee Communication, (Watson, Towers, 2014) examine modern trends in employee communication. Using survey-based research and organizational case studies, the authors conclude that digital communication tools improve employee engagement, message consistency, and feedback mechanisms within organizations.

Similarly, in the article The Impact of Technological Tools on Internal Communication in Organizations, published in the Journal of Scientific Business Studies, (Ahmed, 2021) empirically investigates the influence of digital tools on internal communication. Using

quantitative methods, the study concludes that digital technologies significantly improve communication effectiveness and facilitate faster information exchange within organizations.

In the article E-HRM and Employee Engagement: The Role of Digital Communication, published in the Journal of Human Resource Management, (Kaur & Gupta, 2020) examine the relationship between e-HRM systems and employee engagement. Using a quantitative survey methodology, the authors demonstrate that digital communication improves employee participation and strengthens organizational commitment.

3. Digital Communication Technologies in Human Resource Functions

According to (Haines & André , 1997) , digital communication technologies include messaging tools, intranets, employee databases, and Human Resource Information Systems (HRIS). These technologies facilitate communication, interaction, and collaboration between HR departments and employees.

In the research Human Resource Management, (Dessler, 2020) explains that digital communication technologies improve the speed, consistency, and accuracy of HR communication. The author also demonstrates that HRIS and intranet systems help organizations communicate policies, procedures, and organizational changes more effectively.

Likewise, in the research Electronic HRM in the Smart Era, (Bondarouk & Huub, 2018) explain that digital communication technologies improve internal communication by facilitating real-time interaction and increasing the accessibility of HR information. Through conceptual analysis and case-based evidence, the authors demonstrate that digital communication systems contribute to more interactive and participatory communication processes.

In addition, (Marler & Fisher, 2013) in their research paper An Evidence-Based Review of e-HRM, conclude that digital platforms transform HR communication into a more interactive and collaborative process that enhances employee engagement and participation in organizational communication.

4. Digitalization and the Evolution of HR Communication Channels

In the article HRM in the Digital Age – Digital Changes and Challenges, published in Human Resource Management Review (Parry & Strohmeier, 2014), explain that Human Resource communication was traditionally limited to face-to-face interaction and paper-based communication channels. However, digitalization introduced communication methods such as

emails, instant messaging, social networking platforms, and virtual meeting tools. The study explains that digital communication technologies improve communication speed and flexibility while requiring HR professionals to develop appropriate digital communication skills.

Similarly, in Digital Human Resource Management: A Conceptual Clarification, (Strohmeie, 2020) emphasizes that Digital HRM improves the immediacy, directionality, and employee-centeredness of communication processes within organizations.

5. Strategic Alignment Between Digital HRM and Internal Communication

In Human Resource Management in the Digital Age, (Bondarouk & Ruël, 2019) explain that digital HRM initiatives must be strategically aligned with organizational objectives in order to improve communication effectiveness. Using conceptual modeling, the authors explain that the absence of strategic alignment reduces the effectiveness of internal communication systems.

Likewise, in Human Resource Management at Work, (Marchington & Wilkinson, 2018) conclude that strategically aligned digital communication systems contribute to improving employee engagement, organizational commitment, and performance management.

In the article Excellence in Internal Communication Management, published in Business Horizons, (Men & Bowen, 2016) explain that digital communication channels facilitate symmetrical communication and strengthen employee dialogue within organizations. Similarly, (Marchington & Wilkinson, 2018) explain that digital employee voice tools improve trust, fairness, and employee involvement in decision-making processes.

6. Digital HR Communication and Organizational Transparency

According to (Watson, 2014), organizations that use digital communication platforms tend to be more transparent and develop stronger trust relationships with employees.

Similarly, (Dessler, 2020) explains that digital systems improve communication accuracy and accelerate information flow within organizations. In the same perspective, (Marler & Fisher, 2013) conclude that digitalization strengthens both vertical and horizontal communication within organizations. Furthermore, (Kaur & Gupta, 2020) highlight that effective digital information flow improves workplace coordination and supports organizational learning.

7. Challenges of Digitalizing Internal Communication in HRM

In the article HRM in the Digital Age – Digital Changes and Challenges, published in Human Resource Management Review, (Parry & Strohmeier, 2014) explain that organizations face challenges such as information overload, resistance to change, and insufficient digital skills.

Likewise, in Digital Human Resource Management: A Conceptual Clarification, (Strohmeie, 2020) highlights concerns related to data privacy, cybersecurity, and the reduction of interpersonal interaction in digital work environments.

8. Literature Synthesis and Research Gap

The literature review demonstrates a strong consensus regarding the positive role of digitalization in improving Human Resource Management and internal communication effectiveness. Studies conducted by (Bondarouk & Ruël, 2019) , (Strohmeie, 2020) , and (Men & Bowen, 2017) confirm that digital communication technologies improve transparency, employee engagement, communication speed, and organizational interaction.

However, the literature also reveals several gaps, particularly regarding contextual differences, implementation challenges, and the long-term effects of digital communication on employee relationships. Most previous studies focus on developed organizational contexts, while limited empirical research examines the impact of digital HRM tools on internal communication effectiveness in Algerian organizations. Therefore, this gap justifies the need for further empirical investigation into the relationship between digital HRM tools and internal communication effectiveness within organizations.

SECTION 02: THE THEORETICAL FRAMEWORK

The Technology Acceptance Model, Unified Theory of Acceptance and Use of Technology, Media Richness Theory, Shannon-Weaver Communication Model, and Sociotechnical Systems Theory explain how digital HR tools influence employees' communication and interaction inside organizations. These theories show that the acceptance and effective use of digital technologies improve information exchange, communication quality, and organizational coordination. Therefore, they provide a theoretical basis for analyzing the impact of HR digitalization on the effectiveness of internal communication.

1. Sociotechnical Systems Theory Tavistock

1.1.Definition of Sociotechnical Systems Theory Tavistock

The term “sociotechnical” refers to the interrelatedness of social (people, society) and technical (machines, technology) elements. Sociotechnical theory is founded on two main principles. First, the interaction of social and technical factors creates the conditions for successful or unsuccessful system performance through both linear and non-linear relationships. Second, optimizing either the social or the technical subsystem in isolation increases unpredictable and harmful relationships. Therefore, the core of sociotechnical theory is joint optimization-designing social and technical factors together for optimal system performance (Walker, G. H; Stanton, N. A; Salmon, P. M; Jenkins, D. P, 2008)

1.2.The Irrationality of Rationality

traditional organizational design is rooted in formal rationality (industrial-age thinking), characterized by efficiency, predictability, quantification, and control. However, a central paradox is that these rational systems often become irrational. Bureaucracies degenerate into inefficiency due to red tape, become unpredictable, and produce poor-quality work. Classic command and control (C2) can actively create inefficiency and loss of control. The source of these problems is that systems cannot be maintained in a fixed or closed state. As they grow larger, they become a prime cause of non-linear change. In military contexts, this has contributed to asymmetric warfare, where rigid closed systems struggle against agile opponents (Walker, G. H; Stanton, N. A; Salmon, P. M; Jenkins, D. P, 2008)

1.3.Key Principles of Sociotechnical Systems

Drawing on the seminal coal mining study by Trist and Bamforth (1951) (Walker, G. H; Stanton, N. A; Salmon, P. M; Jenkins, D. P, 2008) , identify three enduring principles.

Responsible autonomy refers to small group organisation without continuous external supervision. In hazardous circumstances, group membership enables continuous, redundant interactions to build mutual awareness

Adaptability means that simple organisations with complex jobs outperform complex organisations with simple jobs. Outcomes become more important than the precise means by which they are achieved

Meaningfulness of tasks arises when a single, small group experiences the entire cycle of operations, giving the task total significance and dynamic closure. This links to skill variety, task identity, autonomy, and feedback. (Walker, G. H; Stanton, N. A; Salmon, P. M; Jenkins, D. P, 2008)

1.4.Open Systems Concepts

sociotechnical theory adopted open systems theory from von Bertalanffy (1950). Three characteristics define an open system. First, import and export: open systems exchange information with their environment, while closed systems do not. Second, steady states: an open system remains constant as a whole despite constant flow of components; a closed system is programmed, while an open system learns. Third, equifinality: the same final state can be reached from different initial conditions and in different ways, enabling self-synchronisation and rapid adaptation. (Walker, G. H; Stanton, N. A; Salmon, P. M; Jenkins, D. P, 2008)

1.5.Attributes of Jointly Optimised Systems

Based on Davis (1977), (Walker, G. H; Stanton, N. A; Salmon, P. M; Jenkins, D. P, 2008) list the most important attributes of jointly optimised sociotechnical systems. Systemic means all aspects are interrelated. Open system means continuous adaptation to the environment. Self-maintaining social systems are self-regulating without external coercion. Flat structure means fewer organisational layers. Minimal critical specification means only crucial relationships are specified; role-holders evolve the rest. Make large small means smaller, more intimate boundaries for groups. (Walker, G. H; Stanton, N. A; Salmon, P. M; Jenkins, D. P, 2008)

1.6.Relevance to Network Enabled Capability (NEC)

sociotechnical theory is highly relevant to modern command and control paradigms, specifically Network Enabled Capability (NEC). Two options exist for organisations facing complexity: increase internal complexity (more staff functions) or reduce internal control needs (simple organisations with complex jobs). NEC aligns with the second option. The vision of NEC includes self-synchronising forces, removal of traditional hierarchies, distributed interaction patterns, agility, and peer-to-peer synchronisation. Sociotechnical theory brings a decisive advantage: a fifty-year pedigree of successful implementations in commercial organisations

Contemporary developments include open sociotechnical systems (flexible group membership), sociotechnical capital (mass collaboration), and new visualisation methods. Future research directions include evolving user requirements and blurred boundaries between developers and users. (Walker, G. H; Stanton, N. A; Salmon, P. M; Jenkins, D. P, 2008)

2. The Shannon-Weaver Model of Communication

2.1.Definition the Shannon-Weaver Model of Communication

the Shannon-Weaver model is a data transmission model originally developed by Shannon and Weaver in 1949. It is the most commonly used communication model at the technical level and has been adapted by many other disciplines, including the behavioral sciences. The model is fundamentally a model of the flow of information through a medium. However, Al-Fedaghi notes that the model has been criticized for being incomplete and biased toward technical media, as it suggests that communication is frequently direct and unidirectional, whereas real-world communication is almost never unidirectional and is often indirect. (Al-Fedaghi, 2012)

2.2.Weaknesses of the Shannon-Weaver Model

several weaknesses of the original model based on existing critiques. First, the model is not analogous to much of human communication. Second, it is only formal and does not account for content. Third, it is static and linear. Additionally, the model does not clearly define the conceptual relationship between a "message" and a "signal." The transmitter "transforms" the message into a signal, and the receiver "transforms" the signal back into a message, but the exact nature of this transformation remains unclear. The author argues that using the same type of arrow to represent the flow of different "things" (message vs. signal) is conceptually problematic, similar to representing electricity and water with the same symbol in a technical diagram (Al-Fedaghi, 2012)

2.3.The Flowthing Model (FM) as a Solution

To address these weaknesses, (Al-Fedaghi, 2012) introduces the Flowthing Model (FM), which represents communication based on two fundamental notions. First, a flow represents the conceptual movement of flowthings. Second, a triggering represents the start of a new thing, such as another flow or an operation. Flowthings are things that can be transferred, released, created, arrived, accepted, and processed by flow systems. In the context of communication, flowthings include data, information, knowledge, signals, and bitstreams. The stages of the flowsystem comprise Creation, Release, Transfer, Arrival, Acceptance, and Processing. Whenever arriving flowthings are always accepted, the stages Arrive and Accept are represented as a single stage called Receive

The logical sequence of stages is important. Any flowthing cannot be transferred before being released. A released flowthing cannot arrive without first being transferred. A flowthing that has

been released, transferred, arrived, accepted, and processed cannot be in the created state. (Al-Fedaghi, 2012)

2.4.Carrier and Content Distinction

makes a critical conceptual distinction between a carrier and content. A signal is a carrier, and what it carries is the content. The author states that a signal without content is meaningless. Conceptually, the carrier carries the content; otherwise, it serves no purpose. However, the absence of content from the carrier in the original Shannon-Weaver model is the result of implementation considerations such as optimization of carrier size and speed of transmission. In practice, every carrier is associated with one and only one content. If the recipient knows this association through a shared code or "a priori shared context," then it is practically unnecessary for the carrier to physically transmit that content. The arrival of the carrier triggers knowledge of the content

For example, if a sender and receiver agree that carrier No. 4 means "Happy Birthday," then after this agreement, the sender needs only to send the carrier to communicate the message. The carrier itself does not need to carry the literal content. This is what creates an "a priori shared context," a prerequisite for achieving any communication whatsoever. (Al-Fedaghi, 2012)

2.5.Representation of Noise

In the FM-based representation, noise created in the channel can fertilize a carrier in the channel sphere. Conceptually, the carrier that arrives at the channel is different from the carrier that leaves if it is infected with noise (e.g., 0101 instead of 0100). This provides a clearer conceptual account of how noise affects the communication process. (Al-Fedaghi, 2012)

2.6.Application to Westley and MacLean's Model

the FM representation to the Westley and MacLean model (WMM) of mass communication, which is described as the classical model in the mass communication field. The WMM presents an interesting feature of an intermediary level between the source of the message and its recipient. The FM representation distinguishes clearly between signals and information. For example, a receiver may not receive a signal even though it is transmitted, or may not process it even though it is received, or may not convert the signal to information (e.g., a young child seeing flames does not understand the danger). The FM representation has several merits, including more precise specification of different types of flows and sequences. (Al-Fedaghi, 2012)

3. Organizational Information Requirements, Media Richness, and Structural Design

3.1.Why Do Organizations Process Information?

the traditional answer in the literature is that organizations process information to reduce uncertainty. This line of reasoning began with Galbraith (1973), who explained that organizations adopt different structural forms based on the amount of information needed to reduce task-related uncertainty and achieve acceptable performance. However, Daft and Lengel propose a second, more tentative answer: organizations also process information to reduce equivocality. Equivocality means ambiguity and the existence of multiple and conflicting interpretations about an organizational situation. When equivocality is high, new data may be confusing and may even increase uncertainty. Managers reduce equivocality by defining or creating an answer rather than by learning the answer from collecting additional data (Daft, R. L & Lengel, R. H, 1986)

3.2.Two Information Contingencies: Uncertainty vs. Equivocality

Uncertainty is defined as the absence of information. As information increases, uncertainty decreases. Galbraith defined uncertainty as "the difference between the amount of information required to perform the task and the amount of information already possessed by the organization." Organizations facing high uncertainty must ask many questions and acquire more information to find answers. The underlying assumption is that questions can be asked and answers can be obtained

Equivocality means ambiguity, confusion, and lack of understanding. High equivocality means that participants are not certain about what questions to ask. If questions are posed, the situation is ill-defined to the point where a clear answer will not be forthcoming. For example, Mintzberg et al. (1976) examined 25 organizational decisions and found decision making under ambiguity where almost nothing was given or easily determined. Managers had to define and figure things out for themselves

The two forces are complementary. Uncertainty is a measure of the organization's ignorance of a value for a variable in an information space. Equivocality is a measure of the organization's ignorance of whether a variable exists in that space. Equivocality leads to the exchange of existing views among managers to define problems and resolve conflicts. Uncertainty leads to the acquisition of objective information to answer specific questions. (Daft, R. L & Lengel, R. H, 1986).

3.3.Integrating Framework: Four Cells

(Daft, R. L & Lengel, R. H, 1986) combine uncertainty and equivocality into a single framework with four cells.

Cell 1 (Low Uncertainty, High Equivocality): This cell is typified by a few events that are equivocal and poorly understood. Managers rely on judgment and experience to interpret these events. They exchange views to enact a common perception. Answers are obtained through subjective opinions rather than objective data. Examples include the feasibility of acquiring a corporation or goal setting among managers from different departments. Approaches to resolve this include the Delphi technique and dialectical inquiry

Cell 2 (High Uncertainty, High Equivocality): Many issues are poorly understood, and participants may be in disagreement. Issues may also be amenable to gathering new data. A special study might be undertaken to gather data combined with discussion and managerial judgment. This situation is characterized by rapid change, unanalyzable technology, unpredictable shocks, and trial-and-error learning, such as during rapid technological development or launching new products

Cell 3 (Low Uncertainty, Low Equivocality): New problems do not arise frequently. Issues are well understood, so extensive discussion is not required. The organization relies on a standing body of standards, procedures, policies, and precedents. Routine schedules, reports, and statistical data are the primary information base. This is typified by an organization using routine technology in a stable environment

Cell 4 (High Uncertainty, Low Equivocality): Managers need additional information about many issues but know what questions to ask and the source of external data. For example, if clerical turnover is increasing, managers might conduct a survey of reasons for leaving. Information processing involves data acquisition and systematic analysis. (Daft, R. L & Lengel, R. H, 1986)

3.4.Amount vs. Richness of Information

(Daft, R. L & Lengel, R. H, 1986) distinguish between two aspects of information processing. First, with respect to uncertainty, structural design can facilitate the amount of information needed for management coordination and control. Formal management information systems have greater capacity to carry useful data than standing rules and procedures. Other structural mechanisms include task forces and liaison roles

Second, with respect to reducing equivocality, structural mechanisms must enable debate, clarification, and enactment rather than simply provide large amounts of data. The key factor is the extent to which structural mechanisms facilitate the processing of rich information. Information richness is defined as the ability of information to change understanding within a time interval. Communication transactions that can overcome different frames of reference or clarify ambiguous issues to change understanding in a timely manner are considered rich. (Daft, R. L & Lengel, R. H, 1986)

3.5.Media Richness Hierarchy

Communication media vary in their capacity to process rich information. In order of decreasing richness, the media classifications are: (1) face-to-face, (2) telephone, (3) personal documents such as letters or memos, (4) impersonal written documents, and (5) numeric documents. The reasons for richness differences include the medium's capacity for immediate feedback, the number of cues and channels utilized, personalization, and language variety. Face-to-face is the richest medium because it provides immediate feedback so that interpretation can be checked, and it provides multiple cues via body language and tone of voice. Rich media facilitate equivocality reduction by enabling managers to overcome different frames of reference. Media of low richness process fewer cues and restrict feedback and are less appropriate for resolving equivocal issues but are effective for processing well-understood messages and standard data. (Daft, R. L & Lengel, R. H, 1986)

3.6.Seven Structural Mechanisms for Information Processing

(Daft, R. L & Lengel, R. H, 1986) propose seven structural mechanisms along a continuum from rich (equivocality reduction) to lean (uncertainty reduction).

Group Meetings include teams, task forces, and committees. Their comparative advantage is equivocality reduction rather than data processing. Participants exchange opinions, perceptions, and judgments face-to-face to reach a collective judgment and build understanding and agreement

Integrators are organizational positions assigned to boundary-spanning activity, such as product managers, brand managers, and liaison personnel. The integrator role is primarily a way to overcome disagreement and thereby reduce equivocality about goals, interpretation of issues, or a course of action

Direct Contact is the simplest form of personal information processing. When a problem occurs, one manager contacts another for a brief discussion. Direct contact allows managers to exchange views and disagree, facilitating subjective information as well as objective data

Planning includes elements of both equivocality reduction and data sharing. In initial stages, equivocality is high, and managers meet face-to-face to decide overall targets. Once plans are set, they become a data processing device. Planning is placed near the middle because the ongoing process involves both

Special Reports include one-time studies and surveys. Their primary role is to obtain data, interpret it, and thereby reduce uncertainty. Managers know which question to ask before a study is initiated

Formal Information Systems include periodic reports and computer databases such as computer reports, performance evaluations, budgets, and statistical information. These reports reduce managers' uncertainty about well-understood and measurable aspects of the organization but do not serve to reduce equivocality

Rules and Regulations are the weakest and least rich information processing device. They provide a known response to problems that have arisen in the past and apply to recurring, well-understood phenomena. They play almost no part in equivocality reduction. (Daft, R. L & Lengel, R. H, 1986)

3.7.Application to Technology

Based on Perrow's (1967) technology model (task variety and task analyzability), (Daft, R. L & Lengel, R. H, 1986) propose different modes of information processing for each type of technology. For craft technology (low variety, unanalyzable), equivocal issues are handled by personal contact and occasional discussions. For nonroutine technology (high variety, unanalyzable), group meetings are the primary source of information processing using rich media. For engineering technology (low variety, analyzable), management information systems and special studies are important. For routine technology (low variety, analyzable), rules, regulations, and policies guide routine activities. (Daft, R. L & Lengel, R. H, 1986)

3.8.Application to Interdepartmental Relations

Two characteristics influence interdepartmental information processing. Differentiation (differences in goals, time horizons, and frames of reference across departments) is associated

with equivocality reduction. Interdependence (the extent to which departments depend on each other) is associated with uncertainty reduction. When departments are highly differentiated and interdependent, all information processing mechanisms are utilized, including full-time integrators, task forces, and project teams. When differentiation is small but interdependence is high, coordination relies on impersonal communications such as plans, reports, schedules, and budgets. When both are low, standardized rules and operating procedures are sufficient. (Daft, R. L & Lengel, R. H, 1986)

4. Unified Theory of Acceptance and Use of Technology (UTAUT)

4.1.Why Was UTAUT Developed?

According to (Momani, 2020) , UTAUT was developed by address major limitations in eight previous technology acceptance theories: TRA, TPB, TAM, C-TAM-TPB, MPCU, IDT, MM, and SCT. The main limitations were: studying simple technologies rather than complex organizational ones, using students instead of employees, testing after acceptance decisions rather than during adoption, and focusing on voluntary rather than mandatory usage contexts. UTAUT unified the strengths of all eight theories. (Momani, 2020)

4.2.The Empirical Comparison

(Momani, 2020) , tested the eight theories in four organizations at three time points: post-training, one month, and three months after implementation. They identified four moderating variables (gender, age, experience, and voluntariness of use) that increase predictive capability. The eight theories explained only 17% to 42% of variance in behavioral intention, while UTAUT explains 69%, making it the most powerful model (Momani, 2020)

4.3.The Four Core Constructs

Performance Expectancy is the capability of technology to provide benefits and enhance performance. It was represented in TAM as perceived usefulness and is the most significant predictor of behavioral intention

Effort Expectancy is user expectations about ease of use. It was represented in TAM as perceived ease of use and shows significant effects particularly in the post-training phase

Social Influence is the expected influence of others on using technology. It was represented as subjective norm in TRA and TPB. Social influence is significant in mandatory usage contexts but insignificant in voluntary ones

Facilitating Conditions is the organizational and technical infrastructure supporting technology use. When performance expectancy and effort expectancy exist, facilitating conditions become insignificant and instead affect usage behavior directly. (Momani, 2020)

4.4.The Four Moderating Variables

Gender moderates' performance expectancy (stronger for younger men) and effort expectancy (stronger for young women). Age moderates all relations, with stronger effects for older workers on effort expectancy and facilitating conditions. Experience moderates' effort expectancy and social influence (stronger at early stages). Voluntariness of use moderates social influence (significant only in mandatory settings). (Momani, 2020)

4.5.Classification of Technology Acceptance Theories

(Momani, 2020) , classifies theories into two streams. First, by development method: some theories are developed from theoretical research, while others (like UTAUT) are developed by adopting constructs from older theories. Second, by scientific field: psychology and sociology theories focus on behavior, while IT theories focus on system characteristics. UTAUT was developed in the IT field. (Momani, 2020)

4.6.Applications and Extensions

UTAUT has been successfully applied to Internet banking, social media, e-government services, mobile banking, and mobile services across many countries. The most important extension is UTAUT2 (Venkatesh et al., 2012), which added hedonic motivation, price value, and habit for consumer contexts. Another extension is TAUSC, which added enjoyment for social commerce acceptance. (Momani, 2020)

5. The Technology Acceptance Model (TAM)

5.1.Definition of Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) explains why users accept or reject information technology. User acceptance is the pivotal factor determining success or failure of information systems. TAM helps understand how system design characteristics influence user acceptance. (Davis, 1993)

5.2.Theoretical Basis

TAM is based on Fishbein and Ajzen's (1975) attitude paradigm from psychology. It distinguishes between beliefs and attitudes. TAM uses attitude toward using, defined as the degree of evaluative affect an individual associates with using a system in his or her job. (Davis, 1993)

5.3.The Two Core Beliefs

Perceived usefulness is the degree to which a person believes that using a system would enhance job performance. Perceived ease of use is the degree to which a person believes that using a system would be free of effort. These two constructs are statistically distinct

Perceived ease of use has a significant direct effect on perceived usefulness. Between two systems with the same functions, the easier one is seen as more useful. However, usefulness does not affect ease of use. (Davis, 1993)

5.4.The Model Structure

System design features directly influence perceived usefulness and perceived ease of use. Perceived ease of use influences perceived usefulness. Both beliefs directly influence attitude toward using. Attitude directly influences actual system use. (Davis, 1993)

5.5.Key Findings

Data from 112 professional users of electronic mail and a text editor showed that most hypotheses were confirmed. Attitude significantly affected usage. Perceived usefulness had a strong effect on attitude. Perceived ease of use had a smaller but significant effect on attitude and a strong effect on usefulness (Davis, 1993)

5.6.Usefulness is More Important Than Ease of Use

Perceived usefulness was about 1.5 times more important than perceived ease of use in influencing actual system use. Usefulness exerted more than four times as much influence on attitude as ease of use. The effect of ease of use on usage operated almost entirely through its effect on usefulness, not directly through attitude. (Davis, 1993)

5.7.Practical Implication

Many designers believe user friendliness is the key to acceptance. However, usefulness is even more important. Users will tolerate a difficult interface if the system helps them do their job. No amount of ease of use can compensate for a system that does not do a useful task

User acceptance of information technology: system characteristics, user perceptions and behavioral impacts. International Journal of Man-Machine Studies. (Davis, 1993)

SECTION 03: CONCEPTUAL FRAMWORK

This section presents the conceptual framework of the study by examining the main concepts related to digitalization in Human Resource Management and the effectiveness of internal communication. It discusses the definitions and dimensions of digital HRM tools, the digital communication technologies used within HR departments, and the role of digitalization in improving organizational communication processes. In addition, this section explores the main dimensions of internal communication effectiveness, including information quality, communication flow, interaction, transparency, and organizational trust. Finally, it highlights the major advantages and potential risks associated with digital internal communication within organizations.

1. Digitalisation in human resources management

1.1.Definition of Digitalization

Digitalization involves the integration of digital technologies into organizational activities in order to reshape business models and enable new value-creating and revenue-generating opportunities (Bloomberg, 2018) .

Digitalization refers to the growing transformation of different areas of social life as they become structured around digital communication systems and digital media infrastructures (Brennen & Kreiss, 2016) .

Digitization converts traditional analog information into digital data, whereas digitalization leverages these digital technologies to reorganize and transform business or organizational processes (Brennen & Kreiss, 2016).

1.2. Dimensions of Digital Hr Tools Usage

Organizational digitalization encompasses a number of interrelated aspects that change organizational structures, procedures, and cultures; it is not just the use of technology. The application of digital technologies, the utilization of digital platforms and information systems, and the creation of a digital culture that fosters innovation and organizational transformation

are some of these dimensions. Analyzing how digitalization affects organizational performance and HRM practices requires an understanding of these components. (Vial, 2019)

a. Operational Dimension (Automation of Daily Tasks)

The operational aspect of digital human resource management is the automation of daily administrative tasks through digital technologies and Human Resource Information Systems (HRIS). Adoption of e-HR systems enable organizations to automate routine transactional activities such as payroll processing, attendance management, employee records and benefits administration. This automation reduces manual work, saves time, reduces administrative errors and increases operational efficiency in organizations. Digital HR tools also help to process information faster and support better internal communication between departments and employees. Therefore, the operational dimension is important to improve the organizational performance and effectiveness of internal communication. (Kavanagh, M. J; Thite, M; Johnson, R. D, 2012)

b. Strategic Dimension (Strategic Human Resource Management)

The strategic dimension of digital human resource management is the role of digital technologies in supporting strategic planning, decision-making and workforce management in organizations. e-HRM helps organizations align HR practices with organizational strategies by improving access to employee data, facilitating workforce planning and supporting managerial decision-making. Digital HR systems further help organizations to better analyse human resource information, to predict future workforce needs and to improve organizational adaptability in a competitive environment. Thus, the strategic use of digital HR tools contributes not only to administrative efficiency but also to long-term organizational performance and effective internal communication. (Ruël, H, Bondarouk, T, & Van der Velde, M, 2004)

c. The experimental dimension (Employee experience and engagement)

The experiential dimension of digital HRM refers to the enhancement of employee experience, engagement and well-being through digital technologies and enabling organizational practices

The “employee experience” in the New Employee Value Proposition is the combination of cultural, physical and technological environments that empower and enhance employees’ overall perception of their workplace. Digital technologies are a key enabler of positive employee experiences, the study explains, offering accessible communication tools, digital learning, flexible HR services and collaborative work environments. These digital practices

enhance employee engagement, motivation, inclusion and satisfaction, which in turn have positive effects on organizational performance and internal communication effectiveness. The article also highlights the role of employee-centric digital infrastructures in ensuring that employees feel productive, connected and supported at all stages of their professional journey. (Bakker, A. B & Albrecht, S, 2022)

d. Technological and Security Dimension

The dimension of technology and security concerns the incorporation of digital technologies into human resource management systems, the safeguarding of sensitive data and the reliability of the systems. Now, many organizations have started using Human Resource Information Systems (HRIS) and cloud-based systems for better efficiency of operations and faster communication within the company. From a technological perspective, integration means that the various HR functions (recruitment, performance management, payroll, etc.) are linked in a single system. This improves the flow of information, reduces human errors and supports decision making through availability of accurate and real time data.

The digitalization of HR data poses serious problems from the security side, especially in protecting employees' personal information such as biometric data, salaries, and performance evaluations. Organizations adopt a range of security measures to mitigate these risks such as encryption, multi factor authentication (MFA), access control mechanisms and data backup and recovery systems.

Cybersecurity has also become an important part of HR management as cyber-attacks may cause data leaks or interruption of internal processes. Hence, organizations need to implement strong security strategies including state-of-the-art technologies, organizational policies, and employee awareness.

The successful integration of technology in human resource management not only depends on the adoption of digital tools, but also on the ability to secure these systems and ensure their safe and effective use. (Kaur, P & Sharma, M, 2023)

1.3.Digital Tools Used in HR Departments

The Human Resource Information System (HRIS) is one of the most popular tools. It lets businesses store, process, and manage employee data electronically. HRIS lets HR departments automate tasks like payroll processing, keeping track of employee records, and managing

benefits. These systems make things more accurate, cut down on the amount of work that managers have to do, and give them access to HR information in real time. (Kavanagh & Johnson, 2011)

Online recruitment platforms and e-recruitment systems are two other important digital tools that HR departments use. digital recruitment systems help companies find more candidates, lower hiring costs, and speed up the hiring process. (Ulrich & Brockbank, 2005)

2. Digital Internal Communication in Human Resource

2.1.Concept of Digital Human Resource Management (Digital HRM / E-HRM)

Digital Human Resource Management (Digital HRM) or Electronic Human Resource Management (e-HRM) is the use of digital tools and online systems to help with HR tasks and processes in companies. It means using information technology in HR tasks to make them more efficient, make it easier for employees and management to talk to each other, and make information more accessible. e-HRM is the use of web-based technologies to make HR policies and practices easier. These technologies enable organizations to offer HR services via digital platforms and grant employees' direct access to HR information and services. (Bondarouk & Ruël, 2019)

Information technology to do HR tasks like hiring, training, managing performance, and communicating with employees, digital HR systems make HR functions more efficient and effective by automating routine administrative tasks and letting decisions be made based on data. (Strohmeier, 2007)

Digital HRM helps HR departments change from being just administrative units to strategic partners that help the organization perform better. HR professionals can use digital technologies to look at employee data, keep an eye on performance, and help with strategic workforce planning. (Lepak & Snell, 2002)

2.2.Digital Tools Used in HR Departments

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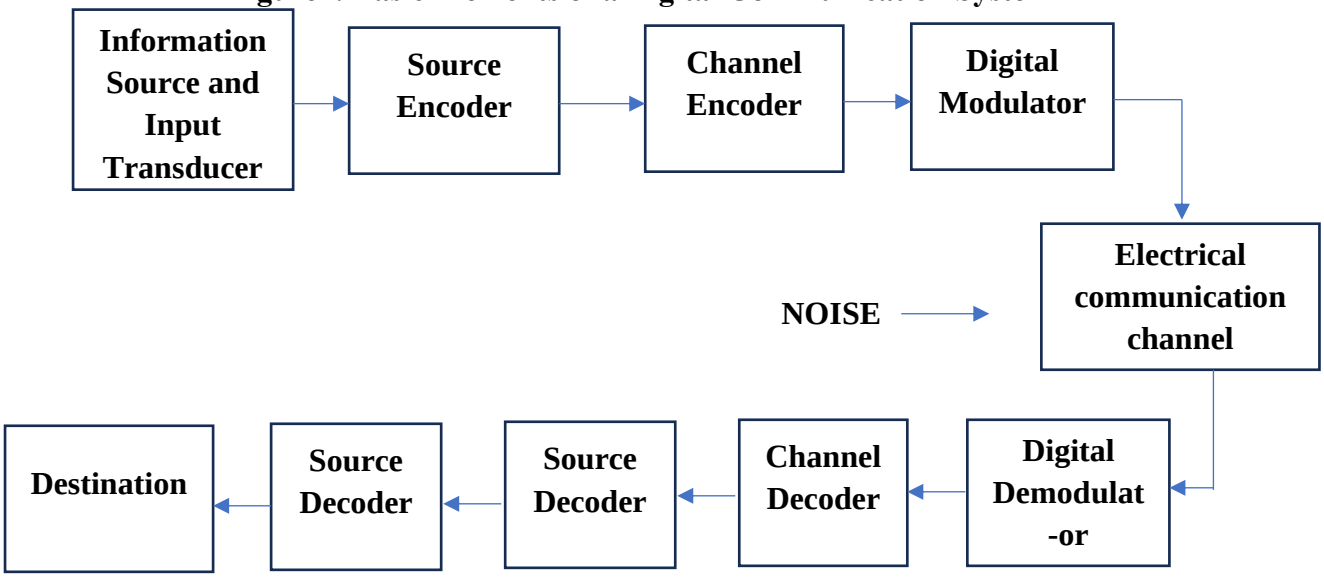
2.3.Digital Communication Tools

Digitalization promotes communication by lowering time and financial costs while enhancing organizational productivity and effectiveness. Communication processes are accelerated through digital technologies, allowing firms to work more efficiently and respond rapidly to internal and external needs. In human resource management, digital solutions such as corporate web interfaces allow employees and managers to enter and access information online. For example, performance reviews can be completed online, facilitating direct communication between employees and HR departments while decreasing paperwork and administrative load. Social media platforms and communication technology also play a crucial role in organizational communication. Tools such as online networks and video conferencing platforms promote contact, cooperation, and information exchange across multiple organizational levels. These tools facilitate both official and informal communication, enhancing engagement and connectivity among employees. Additionally, digital communication platforms assist to knowledge sharing and learning within enterprises. The utilization of online courses, digital content, and electronic documentation helps employees to access information readily and increases continuous communication in training and development processes. (Lumi, 2020)

Figure1: Basic Elements of a Digital Communication System



Source: (Haykin, S; Moher, M; John Wiley & Sons, 2009)

HR departments also need digital learning and training platforms to do their jobs. e-learning systems let companies offer training programs online, which lets employees keep learning and access materials whenever they want. (Noe, 2017)

3. The dimensions of internal communication effectiveness

3.1.Quality and clarity of information

Information quality and clarity are significant aspects of effective internal communication in organizations. Good information is accurate, relevant, complete and timely. This helps employees understand what is going on in the organization in terms of decisions, policies and changes. Good structure and clear communication of information reduce misunderstanding and improves ability of employees to perform their tasks efficiently.

The clarity of information is closely connected with the communication process and the channels applied. Face-to-face interactions and direct communication with managers are rich communication channels that lead to better understanding because they provide immediate feedback, the use of verbal and nonverbal cues, and interactive dialogue. These features enable the transfer of complex information and guarantee that the messages are correctly understood by employees. Also, adequacy and transparency of information are the main features of effective internal communication systems. Open and two-way communication promotes feedback, helps to address employees' concerns, and improves mutual understanding. This leads to increased satisfaction and improved relationships between employees and the organization as employees are kept informed, engaged and valued. Furthermore, the communication channels are of great importance for information quality. Employees tend to prefer channels such as email, meetings and interpersonal communication with managers because these channels provide accessible, timely and understandable information about organizational updates and decisions. Ensuring the quality and clarity of information requires the content to be accurate and relevant, but also the appropriate use of communication channels and interactive communication practices that support understanding and engagement (Men L. R., 2014))

3.2.Speed and flow of communication

A crucial component of organizational transparency under the dimension of disclosure is the flow of communication in terms of pace and timing. Disclosure as the perception that relevant information is received in a timely manner (see Timeliness), which is a critical aspect of the quality of information. The concept of fluency is not explicitly addressed as a separate dimension, but it is close in meaning to clarity, which refers to the perceived lucidity, comprehensibility, and coherence of the information received. The authors suggest that information should not only be disclosed timely but also disclosed in a way that minimizes ambiguity and facilitates understanding, so that a smooth and effective communication flow between the organization and its stakeholders is established (Schnackenberg, A. K & Tomlinson, E. C, 2016)

3.3.Interaction and Two-Way Communication

effective organizational communication is based on interaction and two-way communication with stakeholders. The theory argues that organizations must scan their environment to identify publics who are affected or likely to be affected by the potential organizational decisions or those who seek organizational action to solve problems that are important to them for organizations to behave in socially acceptable ways. Due to this, organizations must communicate symmetrically with publics considering the organizations and their stakeholders' interests to build high-quality relationships in the long run. This view of symmetrical communication is a truly two-way model where the organization not only broadcasts information outwards but is prepared to change its decisions and behaviour in response to stakeholder feedback. While one-way or asymmetrical communication aims to change public behaviour to the benefit of the organization, symmetrical communication is about dialogue, mutual understanding, and conflict resolution. The Excellence Theory also suggests that this kind of two-way interaction benefits organizations by lowering the costs of litigation, regulation, legislation, and negative publicity, as well as reducing the risk of decisions affecting different groups of stakeholders (Grunig)

3.4.Transparency and Organizational Trust

Organizational transparency is not a dimension of trustworthiness (as previously assumed) but a prerequisite of trust. Transparency is defined as "the perceived quality of intentionally shared information from a sender." It has three dimensions:

- ✓ Disclosure – the perception of receiving relevant information in a timely manner.

- ✓ Clarity - the extent to which information is perceived as clear and understandable.
- ✓ Perceived Accuracy – the perception that the information is correct and reliable.

Each dimension affects stakeholders' perceptions of the organization's trustworthiness (ability, benevolence, integrity). Such trustworthiness perceptions, in turn, affect trust in the organization. Like for example:

- ✓ Disclosure is a sign of benevolence and integrity.
- ✓ Clarity improves integrity and ability

Accuracy means integrity and competence.

- ✓ Disclosure - the feeling that relevant information arrives when it is needed.
- ✓ Clarity – the feeling that information is clear and unambiguous.
- ✓ Perceived Accuracy – the perception that the information is correct and reliable.

Each dimension affects stakeholders' perceptions of the organization's trustworthiness (ability, benevolence, integrity). Such trustworthiness perceptions, in turn, affect trust in the organization. Like for example:

- Disclosure is a sign of benevolence and integrity.
- Clarity increases integrity and capacity.

Accuracy breeds integrity and competence.

Transparency is related to trust through the mediating role of trustworthiness. Practical mechanisms organizations use to manage transparency including:

- Sanctioned/unsanctioned secrets (to limit disclosure)
- Open Information Systems (for greater disclosure)
- Insider/outsider frames (increasing or decreasing clarity)
- decoupling/faking vs authentic leadership and auditing (to decrease/increase accuracy). (Schnackenberg, A. K; Tomlinson, E. C, 2016)

4. Advantages and risks of Digital Internal Communication

❖ Advantages

Digital internal communication has a number of major benefits for businesses; First, digital communication technologies are easy to use and fast, which makes it easy for employees to

share information quickly and effectively. This quick communication makes organizations more responsive and helps people make decisions on time. (Lipiäinen, Karjaluoto, & Nevalainen, 2014)

Second, these tools let you save and go at information, which makes things more open and accountable. Employees can read old messages, papers, and updates at any time, which keeps communication going. (Lipiäinen, Karjaluoto, & Nevalainen, 2014)

Another big benefit is that it makes it easier for people all over the world to talk to one other. Digital channels let personnel in different countries and time zones talk to each other easily, which is important for global companies. This helps teams that are spread out across different locations work together and coordinate better. (Lipiäinen, Karjaluoto, & Nevalainen, 2014)

Digital communication also makes it easier to be flexible at work. Employees can work and talk to one other more easily with tools like intranets and online platforms that can be accessible at any time and from anywhere. (Lipiäinen, Karjaluoto, & Nevalainen, 2014)

Digital channels also help employees get involved and engaged. Platforms such as internal social media, blogs, and collaboration tools enhance two-way communication, enabling employees to share ideas, provide feedback, and contribute to corporate strategy. (Lipiäinen, Karjaluoto, & Nevalainen, 2014)

Finally, digital tools can be utilized to communicate corporate culture and company spirit, especially through interactive media such as blogs and internal platforms, which assist boost employees' sense of belonging (Lipiäinen, Karjaluoto, & Nevalainen, 2014)

- **Risks and Limitations of Digital Communication**

Diminished face-to-face interaction: As digital communication tools become more prevalent, employees may communicate less directly, which could erode interpersonal ties inside the company. (Megheni, Z, Missoum, M. R. C, & Nedil, L., 2025)

Information gap among employees: Inequalities in access to information may result from differences in employees' proficiency or frequency of using digital technology. (Megheni, Z, Missoum, M. R. C, & Nedil, L., 2025)

Limited comprehension during online training: Some employees may find it challenging to comprehend the material presented when communication or training is solely handled via digital platforms (Megheni, Z, Missoum, M. R. C, & Nedil, L., 2025)

Dependency on technological infrastructure: Communication processes can be disrupted by technical issues or system failures because digital communication is mostly dependent on technological systems. (Megheni, Z, Missoum, M. R. C, & Nedil, L., 2025)

Employee disparities in digital skills: The successful use of communication technology may be hampered by employees' varying degrees of digital competency. (Megheni, Z, Missoum, M. R. C, & Nedil, L., 2025)

Conclusion of chapter 01

This chapter provides a comprehensive foundation for understanding the relationship between digital Human Resource Management (HRM) tools and internal communication effectiveness. It is structured around three complementary sections. The first section reviews the relevant literature in order to identify the main contributions of previous studies and highlight existing research gaps. The second section presents the theoretical framework by examining key theories that explain communication processes and technology adoption within organizations. The third section develops the conceptual framework by defining the main variables of the study and clarifying the relationship between digital HRM tools and the effectiveness of internal communication. This structure ensures a coherent analytical basis for the empirical investigation.

CHAPTER 2

EMPIRICAL STUDY AND METHODOLOGY

Preamble

This chapter presents the empirical framework of the study through an in-depth overview of the host organization and the research methodology adopted. It is structured into three main sections. The first section introduces the host organization, Sonatrach Hassi R'Mel, by presenting its geographical context, historical development, organizational structure, and main missions. The second section focuses on the Human Resources Division, highlighting its structure, roles, and the digital tools and systems used to support internal communication and HR activities. The third section outlines the research methodology, including the research approach, data collection techniques, sampling procedures, and statistical methods used for data analysis. This structure provides a clear understanding of the research context and ensures the reliability of the empirical investigation.

SECTION 01: PRESENTATION OF THE HOST ORGANIZATION

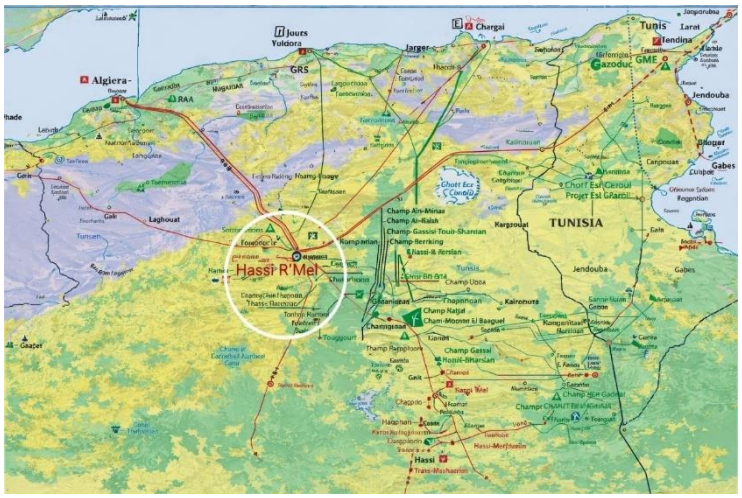
1. General Presentation of the Hassi R'mel Region

a. Geographic Location

Hassi R'mel, the Gateway to the desert, is located 525 km South of Algiers, in This relatively flat region of the northern Sahara. The average altitude is approximately 750 m. The climate is characterized by low rainfall (140 mm per year) and average humidity levels of 19% in Sumer and 34% in winter. Temperature variations are significant, ranging from −5°C in winter to +45°C in Sumer. The prevailing winds are from the Northwest.

- Hassi R'mel is located 525 km south of Algiers.
- The field extends over more than 3,500 km².
- Discovered in 1956, it is one of the largest gas fields worldwide.

Figure2: Map of the Geographical Location of Hassi R'Mel Region



Source: Internal company document

b. History and Development of the Hassi R'mel Field

The Hassi R'mel gas field was discovered in 1956 Following the drilling of the first exploration well (HR-1), reaching a depth of 2,132 maters. This discovery revealed a wet gas reservoir under high pressure, estimated at approximately 309 bars at the bottom-hole conditions. Between 1957 and 1960, eight additional wells were drilled in order to delineate the field and evaluate its reserves, which were initially estimated at around 2,800 billion m³ over an area of approximately 3,500 km².In 1961, a small gas processing unit (MPP 0) was constructed with a capacity of 1.3 billion m³ per year. This

development was followed by the installation of a gas liquefaction plant in 1964, increasing the overall processing capacity to 4.4 billion m³ per year. On February 24, 1971, the nationalization of hydrocarbons marked a major turning point in Algeria's energy sector, allowing a significant increase in processing capacity, reaching 14 billion m³ per year. In 1975, SONATRACH implemented a master development plan aimed at expanding production capacity to 94 billion m³ per year and enhancing the recovery of liquid hydrocarbons through partial gas recycling. This plan included the following major infrastructures: Four gas processing plants (modules I, II, III, and IV), each with a nominal capacity of 20×10^9 m³/year of dry gas ; Two gas reinjection stations (North and South), each with a capacity of 30×10^9 m³/year; A condensate and LPG storage and transfer center (CSTF), with capacities of 80,000 m³ for LPG and 285,000 m³ for condensates;A gas gathering network exceeding 2,000 km; A road network of more than 400 km to connect wells and surface facilities. In 1985, a utilities plant was constructed and commissioned to recover medium- and low-pressure gas and to produce LPG from modules 0 and 1. Between 1991 and 1993, five crude oil treatment centers (CTH) were built and put into operation. In 1998, the CTG gas treatment center at Djebel Bissa was commissioned, followed by the commissioning of the HR-South gas treatment center in 2000.Ultimately, the full development of the Hassi R'mel field enabled the achievement of the following production capacities :100 billion m³ of Natural gas per year,12 million tonnes of condensate per year, 2.5 million tonnes of LPG per year and 700 thousand tonnes of crude oil per year. (Sonatrach H. R.)

c. The Regional Directorate of Hassi R'mel has the Following core missions

The implementation and monitoring of detailed production and shipment programs, in accordance with the general plans established by the Petroleum Engineering and Development Division; (Sonatrach, 2023)

- The management of production operations in compliance with safety rules and regulations;
- The enhancement and optimization of the development of reservoirs and surface facilities;
- The execution of development activities and the provision of all necessary support to ensure the rapid commissioning of wells and surface installations;

- The preparation and supervision of well completion, stimulation, and workover operations, as well as the execution of well interventions;
- The preventive maintenance and protection of the Regional Directorate's installations;
- The engineering and execution of new projects within the Regional Directorate;
- The timely procurement and storage of the materials required for operations, at optimal cost;
- The execution of accounting and financial operations related to the activities of the Regional Directorate;
- The management and maintenance of the fleet of vehicles, trucks, and equipment;
- The administrative management of personnel, as well as the provision of accommodation, catering, and transportation services;
- The preparation and monitoring of the Regional Directorate's budgets.

d. Organizational Structure of Sonatrach – Hassi R'Mel (Annex B)

- The Hassi R'Mel Regional Directorate is organized as follows **(Sonatrach, 2023)**

  - An Engineering and Production Directorate.
  - An HRM Operations Directorate.
  - A Maintenance Directorate.
  - A Technical Directorat.
  - A Logistics Directorate.
  - An Oued Noumer Directorate.
  - A Health, Safety, and Environment (HSE) Directorate.
  - An Information Technology Directorate.
  - A Human Resources Division.
  - A Procurement Division.
  - A General Services Division.
  - A Finance and Accounting Division.
  - A Legal Division.

- A Technical Coordinator.
- An Internal Security Assistant
- An Assistant to the HRM Regional Director.

SECTION 02. HUMAN RESOURCES DIVISION OF SONATRACH HASSI R'MEL

1. Overview and Core Missions

The Human Resources Division plays a strategic role in managing and developing human capital within the Regional Directorate. Its main responsibilities include workforce planning, administrative and social management of personnel, compliance with labor and health regulations, and the promotion of a stable social climate. It also contributes to aligning organizational structures with production objectives and oversees socio-cultural activities as well as personnel mobility, particularly air transport for shift-based employees. (Sonatrach, 2023)

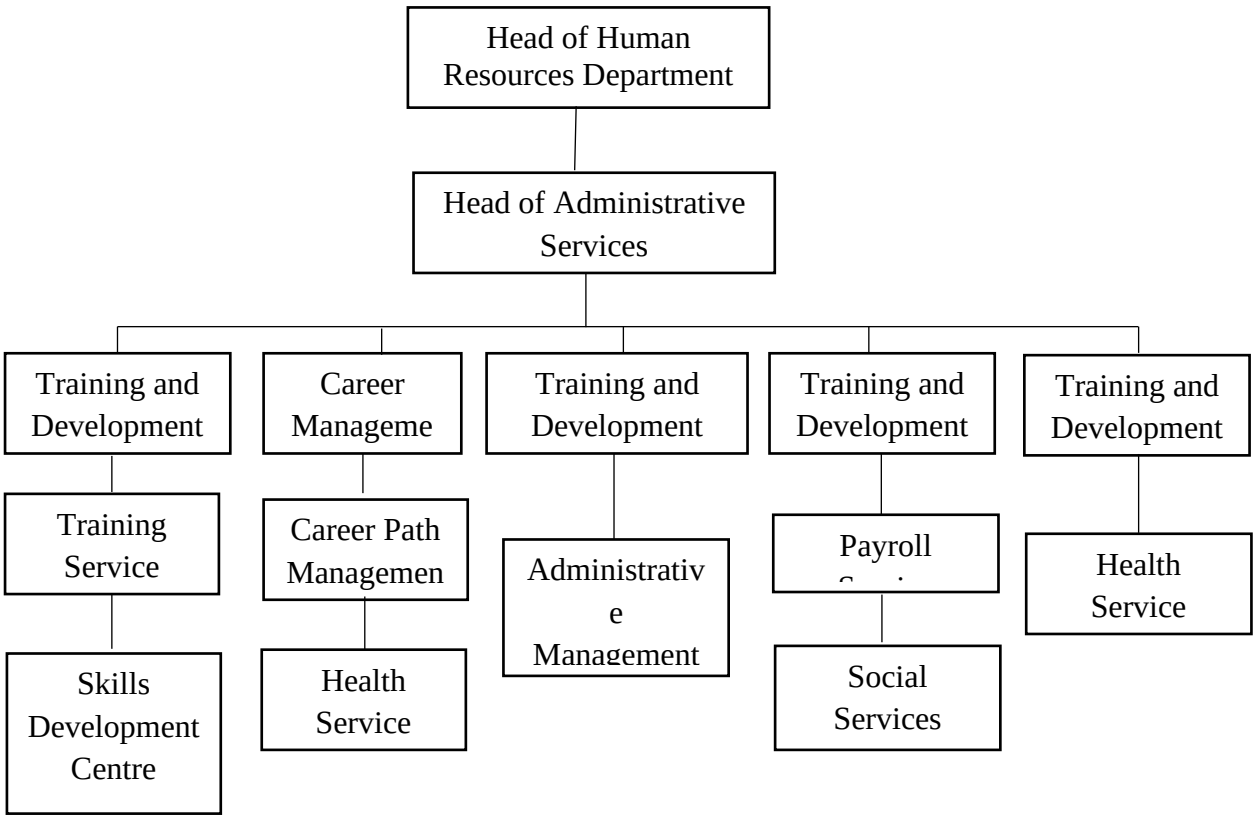
2. Organizational Structure

The Human Resources Division of **Sonatrach** at the Hassi R'mel gas field Regional Directorate is structured into four main units, each responsible for specific administrative and support functions. This internal organization ensures efficient management of personnel-related activities and contributes to the smooth functioning of the division. (Sonatrach, 2023)

The division is composed of the following units:

- **Human Resources Services**: responsible for personnel management, recruitment, and career development.
- **Administrative Services**: in charge of administrative procedures, documentation, and internal coordination.
- **Liaison Service**: ensures communication and coordination between the division and other departments.
- **Sports and Leisure Service**: promotes employee well-being through social, cultural, and recreational activities.

Figure 3: Organizational Structure of the Human Resources Department



Source: Internal company document

3. Applications Used within Sonatrach Company

3.1.Outlook Application

3.1.1. Definition of Outlook

an email program and a personal information management application developed by Microsoft. It is mainly used for sending and receiving emails, but it also provides several other features to organize tasks, appointments, contacts, and notes.

3.1.2. The main features

The main features of Outlook include:

- **Email:** It allows users to create personal or professional email accounts and send and receive email messages.
- **Calendar:** Users can create appointments and tasks and organize them in a personal calendar.

- **Task List:** It allows users to manage different tasks, organize them, and track their progress.
- **Contacts:** Users can manage and organize their contact lists and send emails and meeting schedules to people in their contacts.
- **Notes:** Users can create notes and organize them in one place.

3.1.3. The role of outlook

$Outlook is commonly used in work environments to facilitate communication, organize tasks, and coordinate work. Outlook can be accessed through the desktop application, the web version, or the mobile application on different operating systems such as Windows, Mac, iOS, and Android. (Sonatrach, 2023)

3.2.Microsoft Teams Application

3.2.1. Definition of Microsoft tams

Microsoft Teams is a communication and team collaboration application that can be used for instant messaging, video meetings, voice calls, and file collaboration in a collaborative work environment. It was developed by Microsoft and launched in 2017 as part of the Office 365 solution.

3.2.2. Main Features

Microsoft Teams provides a wide range of features aimed at improving communication and collaboration between teams and groups in the workplace. Some of the main features include:

- **Chats and Instant Messaging:** Users can send instant messages and participate in group or individual conversations with team members. Conversations can be organized into different channels, and users can share files, images, and links.
- **Meetings and Voice/Video Calls:** Users can hold virtual meetings using audio and video, whether they are individual or group meetings. Teams also provides features such as screen sharing, meeting recording, and control of audio and video settings

- **File Collaboration:** Users can share and collaborate on files in Teams. Files are stored in a shared cloud storage space, and members can edit them simultaneously, comment on them, and review them.
- **Applications and Integrations:** Microsoft Teams supports many applications and integrations that can be used to expand team functions. Users can install their preferred applications such as SharePoint, OneDrive, and Power BI, as well as integrate with third-party services such as Trello, Asana, and others.
- **Team Channels and Workspaces:** Users can create different team channels to organize related content, conversations, and files. They can also create workspaces for shared teams to collaborate on specific projects.
- **Planning and Project Management:** Teams provides features for managing projects, tasks, and scheduling. Users can create task lists, assign responsibilities, and track work progress.
- **Security and Control:** Microsoft Teams provides security and protection features to ensure the confidentiality and integrity of sensitive information and data. This includes data encryption, permission control, and protection features against security threats.

3.2.3. Role of Microsoft teams:

Microsoft Teams is widely used in workplaces and organizations to enable teamwork, improve communication between individuals, and facilitate project management. Teams is available as a desktop application, a web version, and a mobile application for different operating systems such as Windows, Mac, iOS, and Android. (Sonatrach, 2023)

3.3.RESHUM application

3.3.1. Definition of RESHUM

RESHUM is an integrated Human Resource Information System (HRIS) used to centralize, manage, and automate HR activities such as training, payroll, and employee data processing, improving efficiency and accuracy in HR operations.

3.3.2. Ain Features

RESHUM is characterized by data centralization, automation of HR processes, time reduction in task execution, error minimization, and the ability to generate reports for evaluation.

3.3.3. Role in HRM

It supports decision-making, improves coordination between HR functions, enhances internal communication, and facilitates efficient management of training and employee information. (Sonatrach, 2023)

4. ALFRESCO APPLICATION

4.1.Definition of Alfresco Content Services

Alfresco Content Services is an Enterprise Content Management (ECM) platform that enables organizations to manage, store, organize, and share digital documents efficiently. It supports digital transformation by providing secure access to information, facilitating collaboration, and automating business workflows.

4.2.Main Features

The platform is characterized by document management, workflow automation, version control, access control, electronic archiving, and collaborative workspaces. It also allows the centralization of organizational documents in a unified digital environment, reducing reliance on paper-based processes.

4.3.Role in Organizations

Alfresco plays a key role in improving internal communication and knowledge sharing by enabling employees to access, share, and update documents in real time. It enhances coordination between departments and ensures secure and structured information management.

4.4.Impact on Organizational Performance

The implementation of Alfresco improves operational efficiency by simplifying administrative tasks, accelerating decision-making processes, and optimizing document

circulation. It reduces delays, increases productivity, and ensures compliance with organizational and security standards. (Sonatrach, 2023)

5. Internal Extension System in Organizational Communication

In large organizations such as Sonatrach, internal communication is often supported by an internal extension system based on IP telephony technologies developed by companies like Cisco Systems. An internal extension is a short telephone number, typically consisting of three or four digits, assigned to each employee or department to facilitate direct communication within the organization. This system allows employees to communicate quickly without relying on external telephone networks, thereby reducing costs and improving efficiency. Key features include simplified dialing, call transfer, call hold and resume functions, and the ability to conduct group communications. The use of internal extensions plays a significant role in enhancing coordination between departments, supporting daily operations, and improving overall organizational performance by enabling rapid information exchange and collaboration among employees. (Systems, 2021)

6. SAP ERP

6.1.Definition of SAP ERP

SAP ERP (Systems, Applications, and Products in Data Processing) is an integrated enterprise resource planning system that enables organizations to manage and centralize core business processes such as human resources, finance, logistics, and operations within a unified digital platform. It is designed to support digital transformation through real-time data processing, system integration, and efficient resource management

6.2.Main Features

SAP ERP is characterized by process integration across departments, real-time data access, centralized database management, workflow automation, and high system reliability and security. It also operates within advanced technological environments such as cloud computing and high-performance databases (e.g., SAP HANA), ensuring scalability and efficiency

6.3.Role in Human Resource Management

In the HR division, SAP ERP plays a strategic role by integrating HR functions such as employee data management, payroll, recruitment, and training. It enhances decision-making through accurate and real-time information, improves coordination between HR activities, and supports better workforce planning and performance management.

6.4.Impact on HRM

The implementation of SAP ERP improves HR performance by increasing operational efficiency, reducing administrative workload, enhancing data accuracy, and accelerating decision-making processes. It also strengthens internal communication and ensures better control and transparency of HR activities.

6.5.Case of Hassi R'mel

At the **Hassi R'mel site**, SAP ERP has not yet been fully implemented. However, the organization has initiated preparatory actions, including organizing workshops and training sessions for employees. This approach aims to facilitate the adoption of the system, and its implementation is expected to take place in the near future. (Sonatrach IT Department, 2018)

SECTION 03: RESEARCH METHODOLOGY

1. Presentation of the research method

1.1.The method

In the present research, a quantitative research method will be adopted to examine the phenomenon of digitalization and its impact in enhancing internal communication within organizations. To achieve the objectives of our study, we have chosen the quantitative approach with the aim of deepening our knowledge on our topic and gathering the necessary information for our study to verify our initially formulated hypotheses.

The method according to (Madeleine, 2006), « Methods of the social sciences »: "the method is a concerted set of operations, implemented to achieve one or more objectives, a body of principles preceding any organized research, a set of standards allowing the selection and coordination of techniques."

1.2.Technique

According to (Angers, 1997)« Initiation pratique à la methodologie des sciences humaines », "The research techniques represent the set of procedures and instruments of investigation, used methodologically to collect data necessary for the verification of hypotheses."

1.3.The questionnaire

First, a questionnaire can be defined as a list of questions, established with the aim of collecting data on a specific subject. According to (BOECK, 1991): « Questionnaire », Université Bruxelles 1991, Mai 2015), "the questionnaire is a list of questions constructed for the purpose of obtaining information corresponding to an evaluation of a functioning

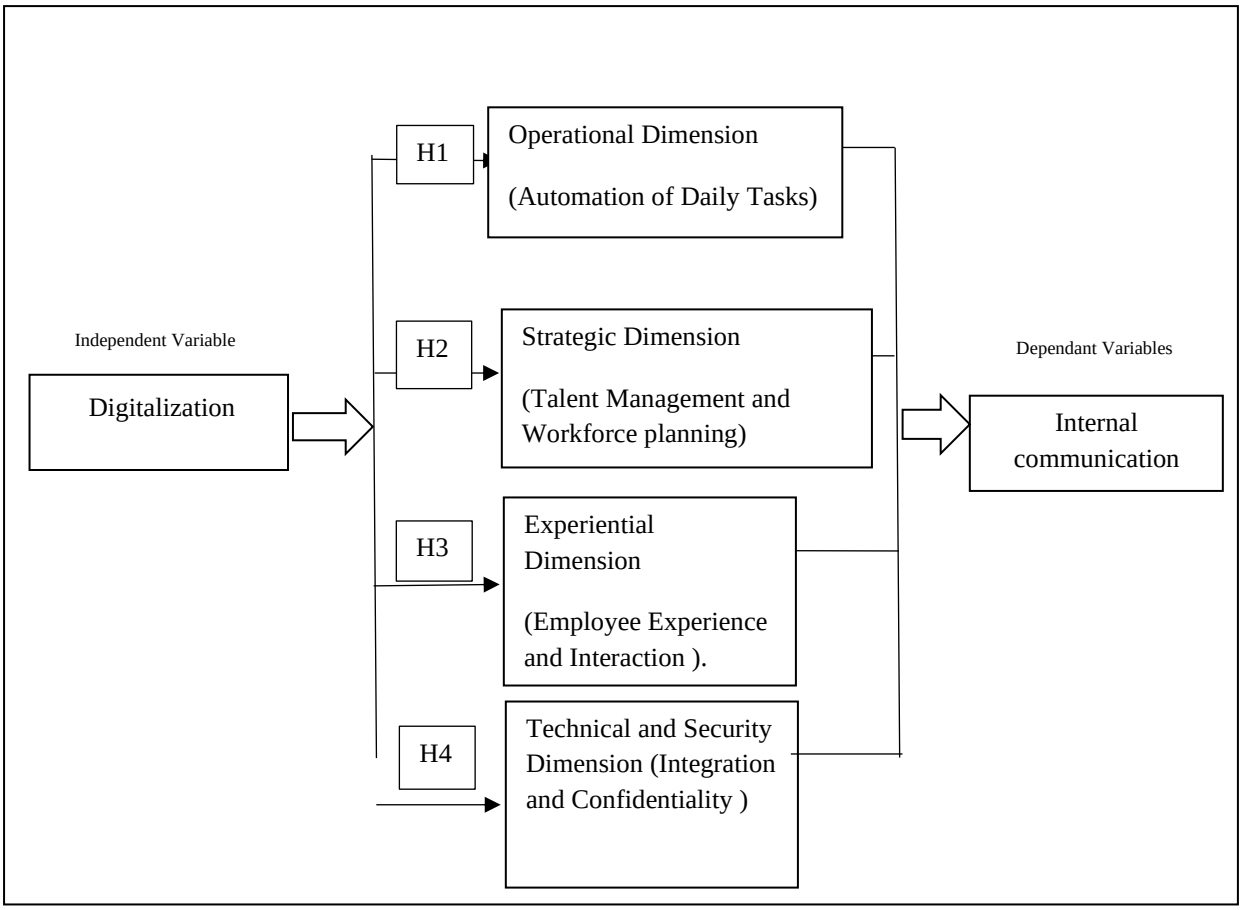
We specifically designed this questionnaire to collect relevant and reliable data concerning the impact of digital Human Resource Management (HRM) tools on the effectiveness of internal communication within the organization. It enables us to draw clear conclusions regarding the research problem and to test the validity of the proposed hypotheses.

In the development of this questionnaire, we relied primarily on structured closed-ended questions based on a Likert scale ranging from “strongly disagree” to “strongly agree.” This type of question facilitates the respondents’ task by allowing them to select the most appropriate answer while ensuring consistency and comparability of responses. It also helps in quantifying perceptions related to different dimensions, such as operational, strategic, experiential, and technical aspects of digital HRM tools, as well as the effectiveness of internal communication in terms of quality, speed, interaction, and transparency.

- **Research model**

Based on previous studies, a research model has been developed for this study, incorporating the dimensions of the independent variable and illustrating the direction of the relationship between the study variables.

Figure 4: Research Model



Source: by student based on previous studies

2. The sample Study Population and Sample

One of the first essential steps required from any researcher is to identify and define the study population and sample before starting any work related to the practical aspect of the research.

2.1.Study Population

The study population consists of all employees of the Human Resources Directorate at Sonatrach, Hassi R'Mel whose total number is 101 employees, distributed according to (job position, gender, professional experience, and age)

2.2.study sample

a) Sample Size and Its Characteristics

To determine the sample size, it is necessary to rely on an appropriate sampling method for the study by following its fundamental steps and respecting its methodological requirements.

b) Sampling Method and Procedures

In order to achieve reliable generalizations and ensure an accurate representation of the study population, while avoiding bias and subjectivity in obtaining results, it was necessary to adopt a systematic sampling procedure. Therefore, the study relied on the probability random sampling method as one of the most appropriate approaches, based on several objective and practical considerations, including:

- The availability of numerical and statistical data related to the study population;
- The clarity and proportional distribution criteria among variables such as (job position, educational level, gender, experience, and age).

Accordingly, the study adopted stratified random sampling, which involves selecting a sample from the population randomly. This method facilitates dealing with accessible individuals and cases suitable for the study and allows the researcher to reach respondents who are easier to contact. It also includes a subtype known as maximum variation sampling, which allows selecting cases according to the study needs and the proportions existing within the study population. Consequently, a sample was selected from different categories of employees while attempting to respect the relative weight of each category in order to achieve the closest possible representation of the original population characteristics. (Ben Jeddal, 2019)

c) Determination of the Sample Size

In order to obtain a representative sample of the study population and determine the appropriate sample size, the Steven Thompson (Bachemani, 2014) , equation for finite populations was applied, as illustrated below:

$$n = \frac{N \times p(1-p)}{\left[\left[N-1 \times \left(d^2 \div z^2\right)\right] + p(1-p)\right]}$$

Where:

- **N**: Population size;
- **Z**: Standard score corresponding to a significance level of 0.95, equal to 1.96;
- **D**: Margin of error, equal to 0.05;
- **P**: Probability of availability of the characteristic and neutrality, equal to 0.50.

By applying the previous equation to a study population of **101 employees** from the Human Resources Directorate at Sonatrach, the following results were obtained:

$$n = \frac{101 \times 0.50(1 - 0.50)}{\left[[101 - 1 \times (0.05^2 \div 1.96^2)] + 0.50(1 - 0.50)\right]} = 80$$

Any value exceeding 80 is considered to represent the total population.

3. Data Processing and Analysis

In this section, the analysis of the collected data is conducted with the aim of providing answers to the research questions and testing the formulated hypotheses. To ensure the reliability and consistency of the results, the data were carefully structured and then processed using SPSS (Statistical Package for the Social Sciences), a tool that enables statistical analyses adapted to the nature of the collected information.

3.1.Verification of the Quality of the Collected Data

Before conducting the main analyses, a set of verifications was carried out to ensure the consistency and reliability of the collected data. These preliminary checks aim to identify potential anomalies that may distort the results, such as reliability testing, missing values when some expected responses are not provided, normal distribution of responses, and multicollinearity. Multicollinearity refers to excessively high correlations between certain explanatory variables. This type of procedure is generally recommended in empirical research, as it helps avoid interpretation biases and ensures the validity of statistical results.

3.2.Univariate Analysis

Descriptive analysis makes it possible to summarize quantitative data and identify their main characteristics through measures of central tendency and dispersion. This provides an initial overview of the data, thereby facilitating the interpretation of the results and the identification of general trends. (DAHAK, 2022)

3.3.Hypothesis Analysis:

Within the framework of our study, hypothesis analysis is carried out in order to examine the impact of the different dimensions of digital HR tools on the effectiveness of the internal communication through linear regression. As highlighted by (Stafford, J & BODSON, P, 2007), multiple regression is appropriate when the objective is to analyse the influence of two or more independent variables on a dependent variable.

4. Difficulties Encountered

During the conduct of this research, several difficulties were encountered, including:

- Difficulty in administering certain questionnaires to employees in the execution category, which created challenges in understanding and interpreting some of their responses.
- Difficulty in collecting and retrieving some of the distributed questionnaires.
- The unavailability of certain staff members at the time of questionnaire distribution

Conclusion of chapter 02

This chapter has provided a comprehensive presentation of the study field and the methodological framework. It highlighted the strategic importance of Sonatrach Hassi R'Mel and the role of the Human Resources Division in managing organizational communication through digital tools. In addition, the chapter detailed the research methodology, including the quantitative approach, data collection process, sampling method, and statistical analysis techniques. These elements ensure the validity and reliability of the empirical study. Overall, this chapter establishes a solid practical foundation for analysing the impact of digital HRM tools on the effectiveness of internal communication, which will be examined in the following chapter.

CHAPTER 03:

RESULTS AND DISCUSSION

Preamble

This chapter presents and analyzes the empirical findings of the study on the impact of digitalization on internal communication in Human Resource Management. It begins with an assessment of data quality, including reliability and normality tests, to ensure the validity of the statistical analysis.

Subsequently, a descriptive analysis of respondents' profiles is provided, followed by a univariate analysis to interpret the central tendencies of the studied variables.

Finally, the chapter examines the research hypotheses through simple and multiple linear regression models in order to determine the nature and strength of the relationship between digitalization and internal communication

SECTION 01: RESULTS

This section aims to present the results derived from the analysis of empirical data.

1. Verification of the quality of the collected data

This section aims to analyze the reliability test, missing values, outliers, multicollinearity, and normal distribution.

1.1.Reliability test

Before proceeding with statistical analyzes, it is essential to ensure the quality of the measurement tools used. The reliability test allows for the evaluation of the internal consistency of scales composed of multiple items measuring the same construct. In order to ensure the internal consistency of the measurement scales used in this research, a reliability test was conducted using Cronbach's alpha coefficient.

Table1: Cronbach's Alpha Reliability Statistics of All Items

Cronbach's Alpha	Number of elements
0.953	**28**

Source: Established by the student based on SPSS outputs

The Cronbach's alpha coefficient reaches 0.953. This score indicates that the scale used to evaluate this questionnaire has good reliability, demonstrating that the participants' responses to the different items are consistent and allow for a relevant measurement of the concept as it is understood within the framework of this study.

1.2.Reliability of independent variable

Table 2: Reliability of the independent variable scale Reliability of independent variable

Cronbach's Alpha	Number of elements
0.913	**14**

Source: Established by the student based on SPSS outputs

For this variable, the Cronbach's alpha coefficient is 0.913. This value indicates a good reliability of the scale, revealing a strong internal consistency among the items.

1.3.Reliability of dependent variable

Table 3: Reliability of the dependent variable scale Reliability of dependent variable

Cronbach's Alpha	Number of elements
0.913	**14**

Source: Established by the student based on SPSS outputs

For this variable, the Cronbach's alpha coefficient is 0.913. This value indicates a good reliability of the scale, revealing a strong internal consistency among the items.

2. Normal distribution

The analysis of the data distribution was carried out to verify their conformity to a normal distribution, using the Kolmogorov-Smirnov test (N > 50).

Table 3: Normal Distribution Analysis

Variables	Sig
Independents Var	**0,154**
Dependants Var	**0,085**
Overall Study	**0,061**

Source: Established by the student based on SPSS outputs

Since the Sig values are all greater than 0.05, the null hypothesis (H1) is rejected in all cases. Thus, we conclude that the data follow a normal distribution (we accept H0).

2. Profile of respondents

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2.1.Graphical representation

a. Gender

Table 5: Analysis of respondents by gender

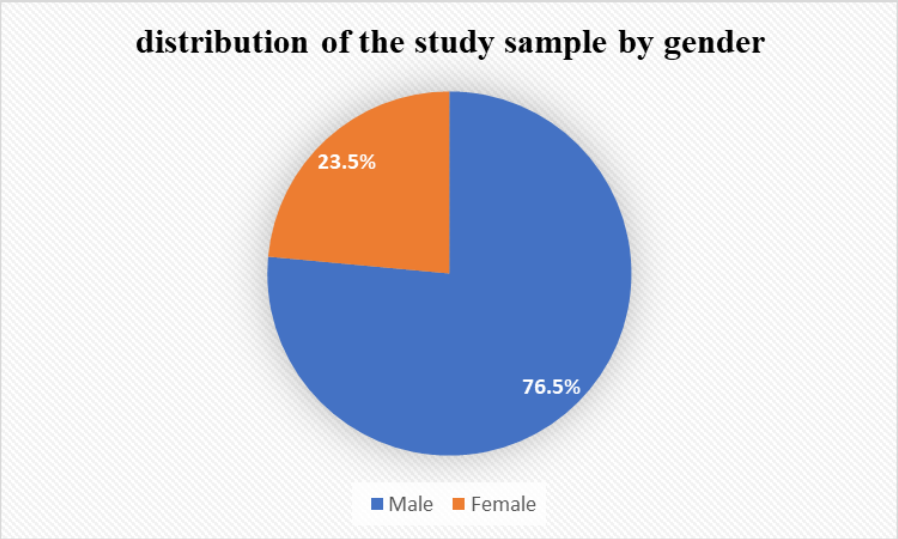
Variables	Attributes of Variables	Frequencies	Percentages (%)
Gender	Male	65	76.5
	Female	20	23.5

Source: Established by the student based on SPSS outputs

The table shows the gender distribution of 85 respondents based on SPSS outputs. The sample is predominantly male, with 65 respondents representing 76.5% of the total. Female respondents account for 23.5% with 20 individuals.

This distribution reveals a clear gender imbalance, with males outnumbering females by more than 3 to 1. The strong male dominance aligns with the earlier data on age, experience, and educational level, which showed a sample of senior, experienced, and highly qualified professionals. For the study on HRM digital tools and internal communication, this suggests that results will largely reflect male perspectives. The limited female representation should be considered when generalizing findings, and future research could aim for a more gender-balanced sample to capture diverse viewpoints.

Figure 5: Distribution Of the study sample by gender



Source: Established by the student based on SPSS outputs

The results illustrated in the graph reveal a clear male predominance within the study sample. indeed, men constitute the overwhelming majority of respondents with a rate of 76.5%, while women represent only 23.5 % of the total sample. this significant gap reflects an underrepresentation of females in the field concerned by the study.

b. Age

Table 6: Analysis of respondents by Age

Variables	Attributes of Variables	Frequencies	Percentages (%)
Age	Under 25years old	2	2.4
	25-34 years old	17	20.0
	35-44 years old	29	34.1
	45 and above	37	43.5

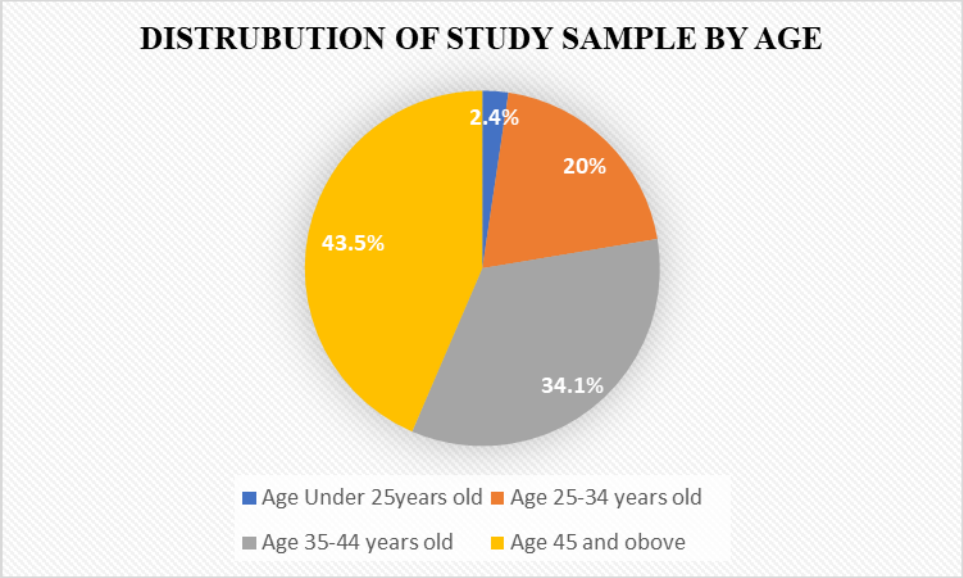
Source: Established by the student based on SPSS outputs

The table displays the age distribution of 85 respondents based on SPSS outputs. The sample is clearly dominated by older age groups, with respondents aged 45 and above representing the largest category at 43.5% with 37 individuals. The 35-44 age group

follows at 34.1% with 29 respondents, meaning 77.6% of the total sample is 35 years or older. In contrast, younger participants are underrepresented. The 25-34 age group accounts for 20.0% with 17 respondents, while those under 25 years old make up only 2.4% with 2 respondents.

This distribution indicates that the field studied is largely composed of experienced and senior professionals. The minimal presence of younger employees suggests that results will primarily reflect the perspectives of older, established staff. When analyzing HRM digital tools and internal communication effectiveness, this age bias should be noted, as views from younger digital-native employees are barely captured.

Figure 6: Distribution of the study sample by age



Source: Established by the student based on SPSS outputs

The results illustrated in the graph reveal a clear predominance of older age groups within the study sample. indeed, respondents aged 45and above constitute the largest proportion at 43.5% followed by those aged 35-44 years old at 34.1%. In contrast, younger participants are less represented, with the 25-34 age group accounting for 20% and those under 25 years old representing only 2.4% of the total sample. This distribution indicates that the field concerned by the study is largely dominated by experienced and senior professionals.

c. Educational level

Table 7: Analysis of respondents by educational level

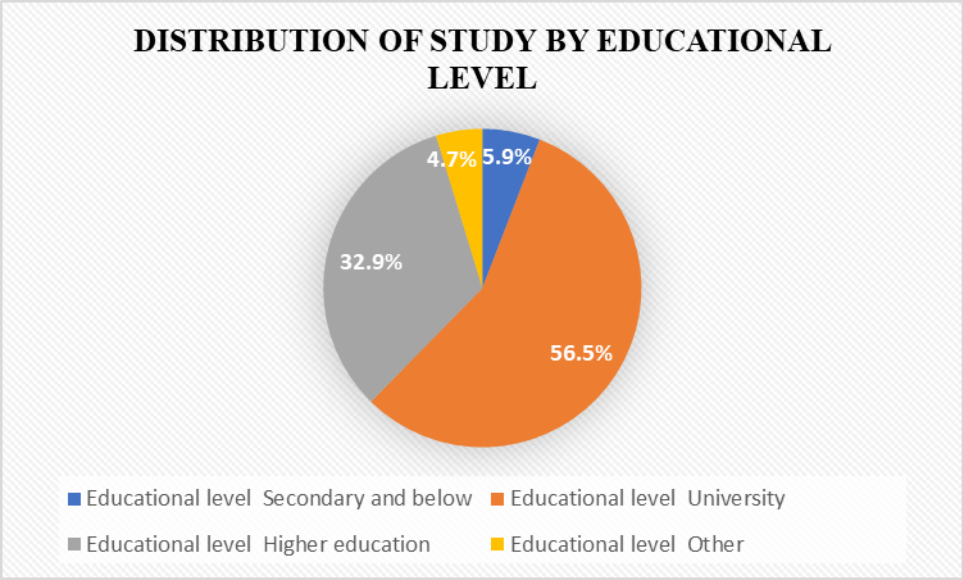
Variables	Attributes of Variables	Frequencies	Percentages (%)
Educational level	Secondary and below	5	5.9
	University	48	56.5
	Higher education	28	32.9
	Other	4	4.7

Source: Established by the student based on SPSS outputs

The table presents the distribution of 85 respondents by educational level, based on SPSS outputs. The sample is highly educated, with university graduates forming the majority at 56.5% with 48 respondents. Higher education accounts for 32.9% with 28 respondents, meaning 89.4% of the total sample holds at least a university degree. In contrast, secondary and below represents only 5.9% with 5 respondents, and "Other" makes up 4.7%.

This distribution shows that the study population is dominated by well-educated professionals. The very low share of lower educational levels suggests that findings on HRM digital tools and internal communication will mainly reflect the views of university and postgraduate staff. This aligns with the previous data on age and experience, confirming that the sample represents senior, experienced, and highly qualified employees.

Figure 7: Distribution Of the study sample by educational level



Source: Established by the student based on SPSS outputs

The results illustrated in the graph reveal a clear predominance of older age groups within the study sample. Indeed, respondents aged 45 and above constitute the largest proportion at 43.5%, followed by those aged 35-44 years old at 34.1%. In contrast, younger participants are less represented, with the 25-34 age group accounting for 20% and those under 25 years old representing only 2.4% of the total sample. This distribution indicates that the field concerned by the study is largely dominated by experienced and senior professionals.

d. Experience

Table 8: Analysis of respondents by experience

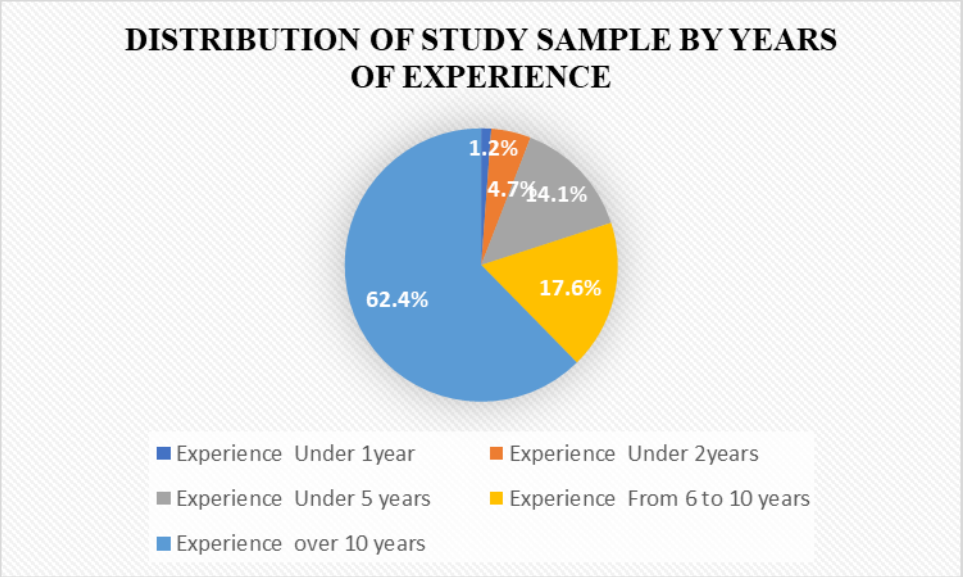
Experience	Under 1year	1	1.2
	Under 2years	4	4.7
	Under 5 years	12	14.1
	From 6 to 10 years	15	17.6
	over 10 years	53	62.4

Source: Established by the student based on SPSS outputs

The table shows the distribution of 85 respondents according to years of experience, based on SPSS outputs. The sample is heavily skewed toward highly experienced

professionals, with 62.4% having over 10 years of experience. Staff with 6 to 10 years represent 17.6%, while those with under 5 years account for only 14.1%. Respondents with less than 2 years and less than 1 year are minimal at 4.7% and 1.2% respectively. This distribution confirms that the study population is dominated by senior and long-serving employees. The very low representation of newcomers suggests that findings will mainly reflect the perspectives of experienced staff. This aligns with the earlier age data showing dominance of older professionals. For research on HRM digital tools and internal communication, it means results capture expert opinions but may overlook challenges faced by new or less experienced employees.

Figure 8: Distribution pf the study sample by Years of Experience



Source: Established by the student based on SPSS outputs

The results illustrated in the graph reveal a clear predominance of highly experienced respondents within the study sample. Indeed, individuals with over 10 years of experience constitute the overwhelming majority with a rate of 62.4%, followed by those with 6 to 10 years of experience at 17.6%. In contrast, participants with less experience are significantly underrepresented, with those having under 5 years accounting for 14.1%, under 2 years for 4.7%, and under 1 year for only 1.2% of the total sample. This distribution indicates that the study sample is largely composed of senior professionals with extensive practical experience.

e. Function

Table 9: Analysis of respondents by function

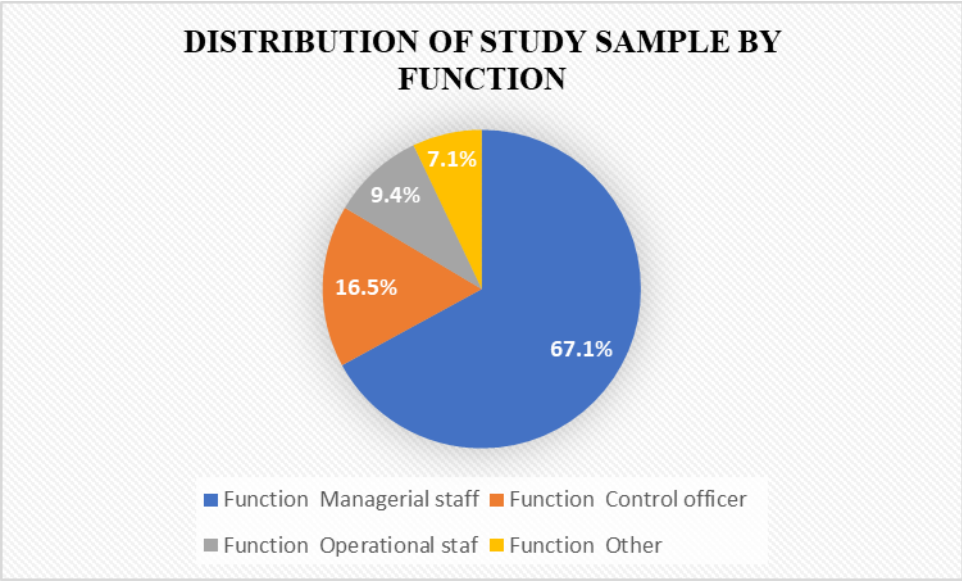
Variables	Attributes of Variables	Frequencies	Percentages (%)
Function	Managerial staff	57	67.1
	Control officer	14	16.5
	Operational staff	8	9.4
	Other	6	7.1

Source: Established by the student based on SPSS outputs

The table shows 85 respondents distributed by job function based on SPSS outputs. Managerial staff dominate at 67.1% with 57 respondents, followed by control officers at 16.5% with 14 respondents. Operational staff are significantly underrepresented at only 9.4% with 8 respondents, while the "Other" category accounts for 7.1%.

This distribution indicates a strong management bias in the sample. Results will mainly reflect managerial perspectives on HRM digital tools and internal communication, with limited input from frontline operational staff. Any conclusions should therefore be interpreted as representing leadership views rather than the whole organization, and future studies should include more operational staff for balance.

Figure 9: Distribution pf the study sample by Function



Source: Established by the student based on SPSS outputs

The results illustrated in the graph reveal a clear predominance of managerial staff within the study sample. Indeed, individuals occupying managerial positions constitute the overwhelming majority with a rate of 67.1%, followed by control officers at 16.5%. In contrast, operational staff and other functions are less represented, accounting for 9.4% and 7.1% of the total sample respectively. This distribution indicates that the study sample is largely composed of decision-makers and supervisory-level professionals.

3. Univariate analysis

The following table presents the ranges of the means corresponding to each response modality of the reversed Likert scale used in the study, in order to facilitate the interpretation of the results.

Table 10: The range of minimum and maximum averages

The interval	[1-1.8 [	[1.8-2.6 [	[2.6- 3.4 [	[3.4-4, 2 [	[4.2-5]
Relative Weights	Strongly disagree	Somewhat disagree	Neutral	Agree	Strongly agree

Source: Established by ourselves based on the Likert scale used.

Table presents the interpretation intervals for the means obtained from the reversed Likert scale used in the study. The scale ranges from 1 to 5 and is divided into five equal intervals to facilitate result interpretation. A mean between [1-1.8[corresponds to "Strongly disagree", while [1.8-2.6[indicates "Somewhat disagree". The neutral zone is represented by [2.6-3.4[for "Somewhat agree". Higher means show stronger agreement, with [3.4-4.2[categorized as "Agree" and [4.2-5] as "Strongly agree".

This framework will be used in the univariate analysis to classify respondents' average scores for each studied dimension. It allows clear interpretation of how participants perceive HRM digital tools and internal communication effectiveness. For example, any dimension with a mean above 4.2 would reflect strong positive agreement among the sample, which is mostly senior, male, and highly educated professionals based on the previous demographic tables.

Table 11: Analysis of statistics according to the studied dimensions

AXES		Mean	Standard deviation	Relatifs weight
INDEP VAR		**3.9662**	**0.61150**	**Agree**
DIMENSION OPERATIONNELLE		**3.7941**	**0.88655**	**Agree**
01	The organization uses digital systems to record attendance, absences, and leave.	3.60	1.197	Agree
02	Salaries and benefits are processed automatically through a centralised system.	3.80	1.003	Agree
03	Employee data (address, phone, skills) is updated in real-time.	3.84	0.998	Agree
04	Leave requests are processed and approved electronically without the use of paper.	3.94	0.930	Agree
	Strategic dimension	**3.9412**	**0.77503**	**Agree**
01	Digital systems help plan the workforce in accordance with the organization's future vision.	3.84	0.998	Agree
02	There is a digital unit dedicated to managing development paths and succession planning.	4.09	0.854	Agree
03	The individual goals of employees are aligned with those of the organization through a balanced scorecard.	4.06	0.761	Agree

04	Performance evaluation relies on continuous feedback and not just on an annual assessment.	4.04	0.794	Agree
	Experiential dimension	**4.0235**	**0.67414**	**Agree**
01	The organization provides an easy-to-use self-service portal for employees.	4.02	0.786	Agree
02	The organization uses interactive internal communication platforms (corporate messaging).	4.02	0.776	Agree
03	The organization offers a mobile application to manage HR services remotely.	4.02	0.690	Agree
	Technological dimension	**4.1059**	**0.59141**	**Agree**
01	The HR system is integrated with the other systems of the organization (finance, projects, etc.).	4.12	0.609	Agree
02	The organization applies strict mechanisms for protecting employees' personal data.	4.06	0.661	Agree
03	The organization has an audit log for each modification of employee data.	4.14	0.693	Agree
	DEP VAR	**4.0779**	**0.54557**	**Agree**
	Quality of information	**4.0676**	**0.66747**	**Agree**
01	The information transmitted through digital HR tools is clear and understandable.	4.12	0.762	Agree

02	Digital systems help reduce errors related to manual processing.	4.05	0.738	Agree
03	Digital tools provide accurate and up-to-date information on policies and procedures. .	4.00	0.900	Agree
04	Access to HR information is easy and unambiguous.	4.11	0.859	Agree
	Speed	4.1137	0.70063	Agree
01	Administrative decisions and announcements are disseminated instantly through digital systems.	4.11	0.845	Agree
02	Digital tools reduce response times to employee requests.	4.11	0.845	Agree
03	Employee requests are processed more quickly than with traditional methods.	4.13	0.753	Agree
	Interaction / communication	4.1029	0.65271	Agree
01	Digital HR tools offer upward communication channels (employees → management).	4.13	0.813	Agree

02	Employees can submit suggestions and complaints online and receive responses.	4.11	0.756	Agree
03	Digital systems encourage open discussions and the exchange of ideas.	4.07	0.799	Agree
04	Digital platforms facilitate the organization of virtual meetings and brainstorming sessions.	4.11	0.724	Agree
	Transparency / trust	4.0275	0.64900	Agree
01	Digital systems promote information transparency at all levels	4.05	0.785	Agree
02	Employees can track their requests with complete transparency.	4.00	0.787	Agree
03	Digital tools strengthen employees' trust in the HR function.	4.04	0.794	Agree

Source: Established by the student based on SPSS outputs

- **Analysis of the studied dimensions**

The analysis of descriptive statistics shows that all the studied dimensions achieve high averages, ranging from 3.79 to 4.11, indicating a general level of agreement among respondents regarding the use and effectiveness of digital human resource management systems.

- **Analysis of independent variable**

The overall mean is 3.9662 with a standard deviation of 0.61150, reflecting a moderate to high general agreement, accompanied by a low to moderate dispersion, indicating a relative homogeneity of responses.

More specifically, the operational dimension records the lowest average (3.7941) with a relatively high standard deviation (0.88655). This suggests that, although the respondents generally agree, there is a greater variability in opinions, particularly on certain aspects such as digital attendance recording (standard deviation = 1.197), reflecting differences in the degree of operational digitalization.
The strategic dimension has an average of 3.9412 and a standard deviation of 0.77503, indicating a satisfactory level of agreement with moderate dispersion. The respondents generally acknowledge the role of digital systems in strategic human resource planning, particularly in terms of skills management and goal alignment.
On the other hand, the experiential dimension shows a higher average (4.0235) and a lower standard deviation (0.67414), indicating a stronger consensus among respondents on the quality of the user experience, particularly through self-service portals and internal communication tools.
The technological dimension achieves the highest average among the dimensions of the independent variable (4.1059) with the lowest standard deviation (0.59141). This indicates a high level of agreement and a great homogeneity of responses, confirming that technological infrastructures (system integration, data security, traceability) are well established and perceived positively.

- **Analysis of the dependent variable**

The dependent variable records an overall average of 4.0779 with a standard deviation of 0.54557, indicating a high level of satisfaction and strong consistency in the responses.
More specifically, the dimension of speed has the highest average (4.1137), indicating that digital systems significantly contribute to reducing delays and improving organisational responsiveness.
The interaction/communication dimension follows with an average of 4.1029, confirming that digital tools effectively facilitate internal exchanges and employee participation.
The quality of the information shows an average of 4.0676, indicating that the provided information is considered clear, reliable, and accessible.
Finally, the dimension of transparency/trust, although slightly lower (4.0275), remains at a high level, indicating that digital systems generally enhance organisational transparency and employee trust.

Overall, the results reveal that all the studied dimensions receive positive evaluations (Agree), with averages above 3.5, confirming a successful adoption of digital HR systems. The relatively low standard deviations indicate a consistency of perceptions among the respondents. However, the operational dimension shows a higher dispersion, suggesting room for improvement in certain operational processes. Overall, digital systems significantly contribute to improving organisational performance, particularly in terms of speed, communication, information quality, and transparency.

4. Testing of hypotheses

This section examines the effect of the independent variable and its dimensions on the dependent variable, using simple and multiple linear regression methods, in order to evaluate the explanatory power of these variables.

a) Analysis of the effect of the independent variable on the dependent variable

Table 12: Results of Simple Linear Regression

Independante Variable	Dependante Variable	Bêta	R^2	T	Sig		Hypothesis
Digitalization	**Internal communication**	0.725	0.526	9.590	0.000		H1

Source: Established by the student based on the SPSS Outputs

• **Hypothesis H0:** Digitalisation does not have a significant effect on internal communication

• **Hypothesis H1:** Digitalisation has a significant and positive effect on internal communication in HRM

The standardised beta coefficient is 0.725, indicating a strong positive influence of the independent variable on the dependent variable.

The coefficient of determination $R^2 = 0.526$ shows that the independent variable explains 52.6% of the variation in the dependent variable.
The t-statistic is well above 1.96 (t = 9.590) and the significance is very low (Sig = 0.000 < 0.05), which confirms that this effect is statistically significant.

The hypothesis H1 is accepted, therefore Simple linear regression equation: internal communication = 1.512 + 0.647 (digitalization).the detailed SPSS outputsfor this analysis are presented in the appendices.

b) Analysis of the effect of the dimensions of the independent variable on the dependent variable

The following table shows us the results of the hypothesis tests

Table 13: Results of Multiple Linear Regression Analysis

Independante Variable	Dependent Variable	Béta	R^2	T	Sig	Hypotheses
Operational dimension	Internal Communication	0.223	0.572	1.818	0.073	H1a
Strategic dimension	Internal Communication	0.159	0.572	1.133	0.261	H1b
Experiential dimension	Internal Communication	0.134	0.572	1.093	0.278	H1c
Technical Dimension	Internal Communication	0.419	0.572	4.663	0.000	H1d

Source: Established by student based on SPSS outputs.

The objective of this analysis is to examine the impact of the different dimensions of the independent variable on the dependent variable through multiple linear regression.

- **Effect of the operational dimension**

❖ Hypothesis**H0**: No significant effect.

❖ Hypothesis **H1a**: The operational dimension has a significant and positive effect. The beta coefficient is 0.223, indicating a weak positive influence of the operational dimension on the dependent variable. The overall coefficient of determination of the model ($R^2 = 0.572$) shows that the dimensions explain 57.2% of the variation in the dependent variable. However, the t-statistic is below the critical threshold ($t = 1.818 < 1.96$) and the significance value ($Sig = 0.073 > 0.05$) exceeds the 5% threshold, indicating that this effect is not statistically significant.

The hypothesis H1a is rejected and the null hypothesis is accepted.

➢ **Effect of the strategic dimension:**

- Hypothesis H0: The strategic dimension does not have a significant effect on the dependent variable
- Hypothesis H1b: The strategic dimension has a significant and positive effect on the dependent variable

The beta coefficient is 0.159, indicating a weak positive influence. However, the t-statistic is low ($t = 1.133 < 1.96$) and the significance is high ($Sig = 0.261 > 0.05$), which shows that the effect of the strategic dimension is not significant on the dependent variable.

Hypothesis H2b is rejected and the null hypothesis is accepted.

➢ **Effect of the experiential dimension:**

- Hypothesis H0: The experiential dimension does not have a significant effect on internal communication
- Hypothesis H1c: The experiential dimension has a significant and positive effect on internal communication

The beta coefficient is 0.134, indicating a weak positive influence. The t-test is below the critical threshold ($t = 1.093 < 1.96$) and the significance ($Sig = 0.278 > 0.05$) confirms the absence of a statistically significant effect.

The hypothesis H1c is rejected and the null hypothesis is accepted.

➢ **Effect of the technical dimension**

- **Hypothesis H0:** The technical dimension does not have a significant effect on the dependent variable.

- **Hypothesis H1d**: The technical dimension has a significant and positive effect on the dependent variable

  The beta coefficient is 0.419, indicating a moderate positive influence of the technical dimension on the dependent variable. The t-statistic is well above the critical threshold (t = 4.663 > 1.96) and the significance is very low (Sig = 0.000 < 0.05), which confirms that this effect is statistically significant.

  The hypothesis H1d is accepted.

❖ **Multiple linear regression equation**

Internal communication in HRM = 1.096 + 0.137 (operational dimension) + 0.112 (strategic dimension) + 0.108 (experiential dimension) + 0.386 (technical dimension)

The results of the simple linear regression show that digitalization has a positive and significant effect on internal communication in HRM. However, the results of the multiple linear regression indicate that only the technical dimension has a significant effect on internal communication in HRM, while the other dimensions do not have a significant effect when analysed separately. These results suggest that the overall effect of digitalisation is primarily explained by the technical dimension, leading to a partial validation of the hypotheses.

5. Differences in the respondents' answers

a) Differences in the study variables based on gender

Table 14: Results of one-way ANOVA analysis of respondents' opinions regarding the study variables according to gender

Group Statistics						
	Sexe	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**	**Discrepancies**
Independent variable	**Male**	***65***	***3.9920***	***.60180***	***.07464***	**No differences**
	Female	***20***	***3.8823***	***.65083***	***.14553***	
Independent variable	**Male**	***65***	***4.0865***	***.50437***	***.06256***	**No differences**
	Female	***20***	***4.0500***	***.67675***	***.15133***	

Source: Established by the student based on the SPSS Outputs

Table shows no statistically significant differences at the 0.05 level in the study variables based on gender. For the independent variable, the mean for males was 3.99 versus 3.88 for females. For the dependent variable, the mean for males was 4.08 versus 4.05 for females.

Although males scored slightly higher on both variables, the differences are minimal and not statistically significant. This suggests that gender does not influence respondents' perceptions of the studied variables in this organization.

b) Differences in the study variables based on age group

Table 15: Results of one-way ANOVA analysis of respondents' opinions regarding the study variables according to age group

ANOVA		Sum of Squares	ANOVA	Sum of Squares
Independent variable dependent variable	Between Groups	Independent variable	Between Groups	Independent variable
	Within Groups	17	Within Groups	.65921
	Total	29	Total	.64977
	Between Groups	dependent variable	Between Groups	dependent variable
	Within Groups	85	Within Groups	.61150
dependent variable	Total	2	Total	.35355
		ANOVA		ANOVA

ANOVA Independent variable	Sum of Squares		Sum of Squares	
	Between Groups	Independent variable	Between Groups	Independent variable
	Within Groups	85	Within Groups	.54557

Source: Established by the student based on the SPSS Outputs

- Table indicates statistically significant differences at the 0.05 level in the study variables based on age. For administrative empowerment, the calculated F value is 3.10 with Sig. = 0.027 < 0.05. Differences favor the under 30 and 31-40 age groups with a mean of 3.80, followed by over 50 at 3.64, and 41-50 at 3.54.

- For creative behavior, the calculated F value is 3.25 with Sig. = 0.022 < 0.05. The under 30 group scored highest with a mean of 4.27, followed by 31-40 at 4.07, 41-50 at 4.03, and over 50 at 3.76.

- These results suggest younger employees report higher levels of empowerment and creative behavior, likely due to greater ambition and openness to change compared to older age groups. Therefore, we reject the null hypothesis stating no age-based differences exist.

c) Differences in the study variables based on educational level

Table 16: Results of one-way ANOVA analysis of respondents' opinions regarding the study variables according to educational level

ANOVA							
		Sum of Squares	Df	Mean Square	F	Sig.	Discrepancies
Independent variable	Between Groups	1.754	3	.585	1.597	0.197	No differences
	Within Groups	29.657	81	.366			

	Total	**31.411**	**84**				
dependent variable	**Between Groups**	**.122**	**3**	**.041**	**.132**	**0.941**	**No differences**
	Within Groups	**24.881**	**81**	**.307**			
	Total	**25.003**	**84**				

Source: Established by the student based on the SPSS Outputs

- Table shows no statistically significant differences at the 0.05 level in the study variables based on educational level. For the independent variable, the calculated F value is 1.597 with Sig. = 0.197 > 0.05. For the dependent variable, the calculated F value is 0.132 with Sig. = 0.941 > 0.05.

- Since both significance levels are greater than 0.05, educational level does not influence respondents' perceptions of administrative empowerment and creative behavior in this organization. Therefore, we accept the null hypothesis stating no differences exist based on educational level.

d) Differences in the study variables based on years of experience

Table 17: Results of one-way ANOVA analysis of respondents' opinions regarding the study variables according to professional experience

ANOVA							
		Sum of Squares	**Df**	**Mean Square**	**F**	**Sig.**	**Discrepancies**
Independent variable	**Between Groups**	**1.078**	**3**	**.359**	**.948**	**0.421**	**No differences**
	Within Groups	**30.309**	**80**	**.379**			
	Total	**31.387**	**83**				
dependent variable	**Between Groups**	**1.688**	**3**	**.563**	**1.933**	**0.131**	**No differences**
	Within Groups	**23.285**	**80**	**.291**			
	Total	**24.973**	**83**				

Source: Established by the student based on the SPSS Outputs

- Table shows no statistically significant differences at the 0.05 level in the study variables based on years of professional experience. For the independent variable, administrative empowerment, the calculated F value is 0.948 with Sig. = 0.421 > 0.05. For the dependent variable, creative behavior, the calculated F value is 1.933 with Sig. = 0.131 > 0.05.

- Since both significance levels exceed 0.05, years of experience do not influence respondents' perceptions of administrative empowerment or creative behavior in this organization. Therefore, we accept the null hypothesis stating no differences exist based on professional experience.

e) Differences in the study variables based on job position

Table 18: of Results of one-way ANOVA analysis of respondents' opinions regarding the study variables according to job position

ANOVA							
		Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**	**Discrepancies**
Independent variable	**Between Groups**	**2.595**	**3**	**.865**	**2.431**	**0.071**	**No differences**
	Within Groups	**28.816**	**81**	**.356**			
	Total	**31.411**	**84**				
dependent variable	**Between Groups**	**1.017**	**3**	**.339**	**1.145**	**0.336**	**No differences**
	Within Groups	**23.985**	**81**	**.296**			
	Total	**25.003**	**84**				

Source: Established by the student based on the SPSS Outputs

- shows no statistically significant differences at the 0.05 level in the study variables based on job level. For the independent variable, administrative

empowerment, the calculated F value is 2.431 with Sig. = 0.071 > 0.05. For the dependent variable, creative behavior, the calculated F value is 1.145 with Sig. = 0.336 > 0.05.

- Since both significance levels exceed 0.05, job level does not influence respondents' perceptions of administrative empowerment or creative behavior in this organization. Therefore, we accept the null hypothesis stating no differences exist based on job level.

SECTION 02: DISCUSSION OF RESULTS

Within the framework of this research, we examined the impact of digitalization on internal communication in Human Resource Management at Sonatrach. The main objective was to analyze the extent to which the different dimensions of digitalization namely the operational dimension, the strategic dimension, the experiential dimension, and the technological and security dimension contribute to improving the effectiveness of internal communication within the organization.

This section aims to discuss the results obtained through simple and multiple linear regression analyses. The objective is to interpret these findings in light of the research hypotheses and compare them with previous studies presented in the theoretical framework. This discussion provides a deeper understanding of the influence of digitalization on internal communication in the Algerian organizational context.

1. Descriptive Analysis of Participants' Profile

The analysis of the socio-demographic profile of the respondents highlights several important characteristics that can be linked to trends identified in the literature related to digital human resource management and internal communication.

1.1.Gender

The distribution of respondents by gender reveals a predominance of male participants, representing the majority of employees involved in the study. This observation can be explained by the nature of the oil and gas sector, where male employees are generally more represented, especially in operational and technical positions. This result is

consistent with the organizational reality of large industrial companies such as Sonatrach, where male employment remains dominant.

1.2.Age

The findings indicate that the majority of respondents belong to the age category above 35 years old, particularly employees aged more than 45 years. This reflects the presence of experienced employees who have accumulated long professional careers within the organization. These employees are more capable of evaluating the effectiveness of digital HR communication systems because of their long-term exposure to both traditional and digital communication practices.

1.3.Educational Level

University graduates and employees with postgraduate qualifications constitute the largest proportion of the sample. This result suggests that employees with higher educational backgrounds are more familiar with digital tools and organizational communication systems. This finding supports the argument of (Bondarouk & Ruël, 2019);who emphasized that digital HRM practices are more effective when employees possess sufficient educational and digital competencies.

1.4.Professional Function

Most respondents occupy managerial and supervisory positions within the organization. This category of employees is directly involved in communication processes, decision-making, and the implementation of HR digital systems. Their participation enriches the study by providing informed perceptions regarding the effectiveness of digital internal communication practices.

1.5.Professional Experience

The majority of participants possess more than ten years of professional experience. This indicates that employees have witnessed the transformation from traditional HR practices to digitalized HR systems. Consequently, they are capable of evaluating the changes brought by digitalization in terms of communication quality, speed, interaction, and transparency.

The Impact of Digitalization on Internal Communication in Human Resource Management

This part discusses the results of regression analyses conducted to evaluate the impact of the different dimensions of digitalization on internal communication.

2. The impact of dimensions of digitalization on the internal communication

2.1.The Impact of the Operational Dimension on Internal Communication

The results of the multiple regression analysis show that the operational dimension does not have a statistically significant effect on internal communication. Although digital operational tools contribute to automating administrative tasks such as attendance management, payroll processing, and leave requests, their direct influence on communication effectiveness remains limited.

This result may be explained by the fact that operational digitalization mainly focuses on administrative efficiency rather than communication quality or employee interaction. This observation partially differs from the findings of (Kavanagh, M. J; Thite, M; Johnson, R. D, 2012);who argued that operational digital systems improve organizational efficiency and facilitate information flow. However, in the context of this study, the operational dimension alone appears insufficient to significantly improve internal communication effectiveness.

This finding constitutes a direct response to the first dimension of the study.

2.2.The Impact of the Strategic Dimension on Internal Communication

The strategic dimension also shows no statistically significant impact on internal communication. Although digital systems support workforce planning, performance management, and strategic decision-making, these practices do not appear to directly enhance communication effectiveness among employees and HR departments.

This result may indicate that the strategic use of digital HR tools within the organization is still primarily focused on managerial functions rather than interactive communication processes. This observation is partially consistent with (Ruël, H, Bondarouk, T, & Van der Velde, M, 2004), who highlighted that strategic digital HRM contributes to organizational alignment but requires strong communication integration to produce visible communication outcomes.

Therefore, the strategic dimension alone does not significantly influence internal communication effectiveness in the studied organization.

2.3.The Impact of the Experiential Dimension on Internal Communication

The results further reveal that the experiential dimension has no statistically significant impact on internal communication. Although digital HR systems improve employee experience through self-service platforms, mobile applications, and collaborative environments, these tools do not significantly influence communication effectiveness according to the respondents' perceptions.

This finding may be explained by differences in employees' engagement with digital platforms or by limitations in the organization's digital communication culture. While previous studies such as (Bakker, A. B & Albrecht, S, 2022) ;emphasized the positive relationship between digital employee experience and engagement, the current results suggest that employee experience alone is not sufficient to guarantee effective communication unless supported by broader organizational communication strategies.

This result provides an answer to the third dimension of the study.

2.4.The Impact of the Technological and Security Dimension on Internal Communication

The analysis demonstrates that the technological and security dimension has a positive and statistically significant effect on internal communication. This indicates that the integration of secure digital systems, HR information systems, and communication technologies significantly improves communication effectiveness within the organization.

Employees perceive that secure and integrated digital platforms facilitate faster information exchange, improve communication clarity, strengthen transparency, and increase trust in HR processes. These findings are consistent with the studies of (Kaur, P & Sharma, M, 2023);and (Dessler, 2020) which emphasized the importance of technological integration and cybersecurity in improving communication quality and organizational trust.

This significant result suggests that technological reliability and data security represent essential factors for successful digital internal communication.

3. The Overall Impact of Digitalization on Internal Communication in Human Resource Management:

The synthesis of the statistical analyses demonstrates that digitalization, considered as a whole, has a significant positive impact on internal communication in human resource management. The simple regression analysis revealed a strong positive relationship between digitalization and internal communication effectiveness.

This result confirms the main hypothesis of the study, which states that digitalization positively influences internal communication in HRM. It indicates that digital HR practices contribute to improving communication quality, accelerating information flow, strengthening interaction between employees and HR departments, and enhancing transparency and organizational trust.

However, a more detailed analysis of the dimensions of digitalization reveals important differences. Among the four dimensions studied, only the technological and security dimension shows a statistically significant effect on internal communication. In contrast, the operational, strategic, and experiential dimensions do not present significant impacts.

These findings suggest that the success of digital internal communication depends mainly on the quality, integration, and security of digital technologies rather than solely on administrative automation or strategic digital planning. The effectiveness of digital communication therefore requires reliable technological infrastructures, secure information systems, and communication platforms capable of supporting interactive and transparent exchanges.

Overall, this discussion provides a direct answer to the research problematic by confirming that digitalization plays an important role in improving internal communication in human resource management. Nevertheless, the effectiveness of this relationship depends largely on the organization’s ability to implement secure and integrated technological systems that support communication processes and employee interaction effectively.

4. Theoretical Implications and Synthesis

The results align with the **Technology Acceptance Model (TAM)**, confirming that "Perceived Usefulness" in the context of Sonatrach is primarily driven by system reliability and security. However, the lack of significance in the strategic and operational dimensions indicates a "Digital Paradox" where the presence of technology

does not automatically translate into strategic communication success. This suggests that for large industrial organizations, the human and cultural adaptation to digital tools often lags behind the technical implementation. (Davis, 1993)

Conclusion of chapter 03

This chapter has demonstrated that digitalization has a significant and positive impact on internal communication within Human Resource Management. The results confirm that digital tools contribute to improving communication quality, speed, interaction, and transparency within the organization.

However, the detailed analysis revealed that only the technological and security dimension has a statistically significant effect, while the operational, strategic, and experiential dimensions do not independently influence internal communication.

Overall, these findings highlight that the effectiveness of digital internal communication depends primarily on the reliability, integration, and security of digital systems, emphasizing the critical role of technological infrastructure in supporting organizational communication processes.

General Conclusion

General Conclusion

In conclusion, this This research has examined the impact of digitalization of Human Resource Management on the effectiveness of internal communication within organizations, with an empirical study conducted at Sonatrach. In the context of increasing digital transformation, this topic has become strategically important for improving organizational performance, communication efficiency, and employee interaction.

Analysis of Results and Practical Implications:

The analysis of the empirical findings provided clear answers to the central research problem regarding the impact of HR digitalization on internal communication effectiveness. The results show that digital HR tools have a significant positive effect on communication quality, information flow speed, transparency, and employee–management interaction. They also enhance employee engagement, collaboration, and overall organizational coordination. However, the effectiveness of digital communication is not uniform across all dimensions, as it strongly depends on employees' digital skills, system integration, and organizational readiness for change. In addition, issues such as data security and strategic alignment of digital tools remain key factors influencing successful implementation. Overall, the findings confirm that HR digitalization is a major driver of more efficient and transparent internal communication, contributing to improved organizational performance and employee satisfaction.

Recommendations:

Based on the empirical results, especially the importance of technical and security dimensions, several recommendations can be proposed for Sonatrach's management:

- **Enhancing System Integration:** Improve the interoperability between HR digital platforms to ensure smooth and continuous information flow and reduce communication fragmentation.
- **Strengthening Digital Skills:** Implement continuous training programs to improve employees' digital competencies and maximize the effective use of HR technologies.
- **Improving Interactive Communication:** Develop feedback mechanisms within digital platforms to promote two-way communication and strengthen employee participation and engagement.

Limitations and Future Research Directions:

This study presents some limitations that should be addressed in future research:

- **Sample Limitation:** The relatively limited sample size restricts the generalization of results; future studies should include larger and more diverse samples.

- **Methodological Approach:** The exclusive use of a quantitative method limits deeper understanding; future research could adopt a mixed-method approach, including qualitative interviews.
- **Context Specificity:** The study focuses only on Sonatrach; future research could extend to other organizations or conduct comparative studies.
- **Dynamic Nature of Digitalization:** Since digital transformation is continuously evolving, longitudinal studies are recommended to track changes over time.

Overall, this study confirms that digitalization in Human Resource Management is no longer an optional tool but a strategic necessity for improving internal communication effectiveness, organizational efficiency, and long-term performance.

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Appendices

Appendix A– Questionnaire

Questionnaire

As Part of the Requirements for Obtaining a Master's Degree Master 2

Specialty: Organizational Management

Dissertation Title: The Impact of Digital HRM Tools on the Effectiveness of Internal Communication in Organizations

<Quantitative Study: Sonatrach Regional Directorate in Hassi R'Mel>

Prepared by: BERBACHE Nour El Houda

Notice to Participants

This questionnaire is part of an academic research study aimed at analyzing the perceptions of administrative employees regarding the organization and digitalization of internal communication tools in Human Resource Management (HRM).

Your participation is voluntary and anonymous.

- The information collected:
- Will be used exclusively for scientific research purposes.
- Will not, under any circumstances, be used for the professional evaluation of participants.
- Will be treated confidentially and analyzed collectively.

No personal data that could identify respondents will be collected.

We sincerely thank you for your cooperation and for the time devoted to this study.

Instructions

Please read each statement carefully and tick the response that best reflects your opinion.

Response Scale

1 = Strongly Disagree

2 = Disagree

3 = Neutral

4 = Agree

5 = Strongly Agree

Section A: Personal Information

Gender:

☐ Male ☐ Female

Age:

☐ Under 25 years ☐ 25–34 years ☐ 35–44 years ☐ 45 years and above

Educational Level:

☐ Secondary Education ☐ University Education ☐ Postgraduate (Master's/Doctorate)

☐Other

Professional Experience:

☐ Less than 2 years ☐ 2–5 years ☐ 6–10 years ☐ More than 10 years

Hierarchical Level:

☐ Executive ☐ Supervisor ☐ Operational Staff ☐ Other

N°	Section	Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	Part One: Use of Digital Humane Resources Tools (independent Variable)						
1	**B Operational Dimension (Automatio**	The organization uses digital systems to record attendance, absences, and leaves.					

	n of Daily Tasks)						
2	**B** **Operational Dimension (Automation of Daily Tasks)**	Salaries and benefits are processed automatically through a centralized system.					
3	**B** **Operational Dimension (Automation of Daily Tasks)**	Employee data (address, phone number, skills) are updated in real time.					
4	**B** **Operational Dimension (Automation of Daily Tasks)**	Leave requests and approvals are processed electronically without the use of paper.					
5	**C** **Strategic Dimension (Talent Management and Workforce Planning**)	Digital systems help in workforce planning in alignment with the organization's future vision.					
6	**C** **Strategic Dimension (Talent Management and Workforce Planning**)	There is a digital unit dedicated to managing development paths and succession planning.					

7	**C** **Strategic Dimension (Talent Management and Workforce Planning)**	Employees' individual goals are aligned with the organization's goals through a balanced scorecard.					
8	**C** **Strategic Dimension (Talent Management and Workforce Planning)**	Performance evaluation relies on continuous feedback, not only on annual reviews)					
9	**D** **Experiential Dimension (Employee Experience and Interaction)**	The organization provides an easy-to-use self-service portal for employees.					
10	**D** **Experiential Dimension (Employee Experience and Interaction)**	The organization uses interactive internal communication platforms (such as corporate messaging systems).					
11	**D** **Experiential Dimension (Employee Experience**	The organization provides a mobile application to manage HR					

	and Interaction)	services from anywhere.					
12	**E** **Technical and Security Dimension (Integration and Confidentiality)**	The organization provides a mobile application to manage HR services from anywhere.					
13	**E** **Technical and Security Dimension (Integration and Confidentiality)**	The HR management tool is integrated with the organization's other systems (finance, projects, etc.).					
14	**E** **Technical and Security Dimension (Integration and Confidentiality)**	The organization applies strict mechanisms to protect employees' personal data.					
		Part Two: Effectiveness of Internal Communication (Dependent Variable)					
15	**A** **Quality and Clarity of**	The information transmitted through digital HR					

	Information	tools is clear and understandable..					
16	**A** **Quality and Clarity of Information**	Digital systems help reduce errors associated with manually transferring information.					
17	**A** **Quality and Clarity of Information**	Digital tools provide accurate and updated information regarding policies and procedures.					
18	**A** **Quality and Clarity of Information**	Access to the required HR information is easy, without ambiguity or complexity.					
19	**B** **Speed and Timeliness of Communication Flow**	Administrative decisions and announcements reach employees immediately through digital systems.					
20	**B** **Speed and Timeliness of Communication Flow**	Digital tools reduce response times to employees' requests.					
21	**B**	Employees' requests (leave, training, etc.) are					

	Speed and Timeliness of Communication Flow	processed faster than with traditional methods..					
22	**C** **Interaction and Two-Way Communication**	Digital HR tools provide channels for upward communication (from employees to management).					
23	**C** **Interaction and Two-Way Communication**	Employees can submit suggestions and complaints electronically and receive responses.					
24	**C** **Interaction and Two-Way Communication**	Digital systems encourage open discussions and the exchange of ideas among colleagues					
25	**C** **Interaction and Two-Way Communication**	Digital platforms facilitate the organization of virtual meetings and brainstorming sessions..					
26	**D** **Transparency and Organizationl Trust**	Digital systems contribute to disseminating information transparently at all levels.					

27	**D** **Transparency and Organizational Trust**	Employees can track the progress of their requests and transactions transparently.					
28	**D** **Transparency and Organizational Trust**	Digital tools enhance employees' trust in the HR department.					

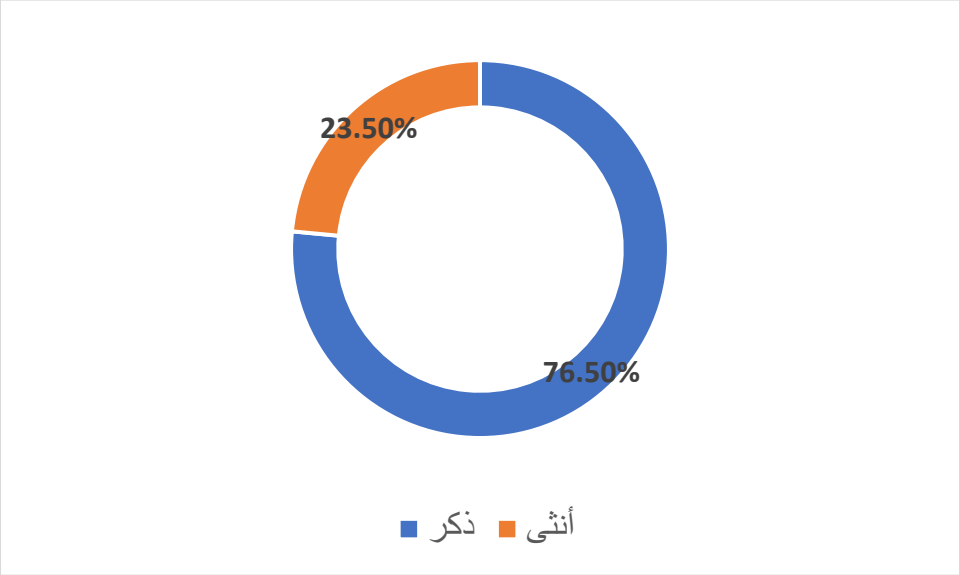
Appendix B – SPSS

RESULTS

1.Personal and Job-Related Variables :

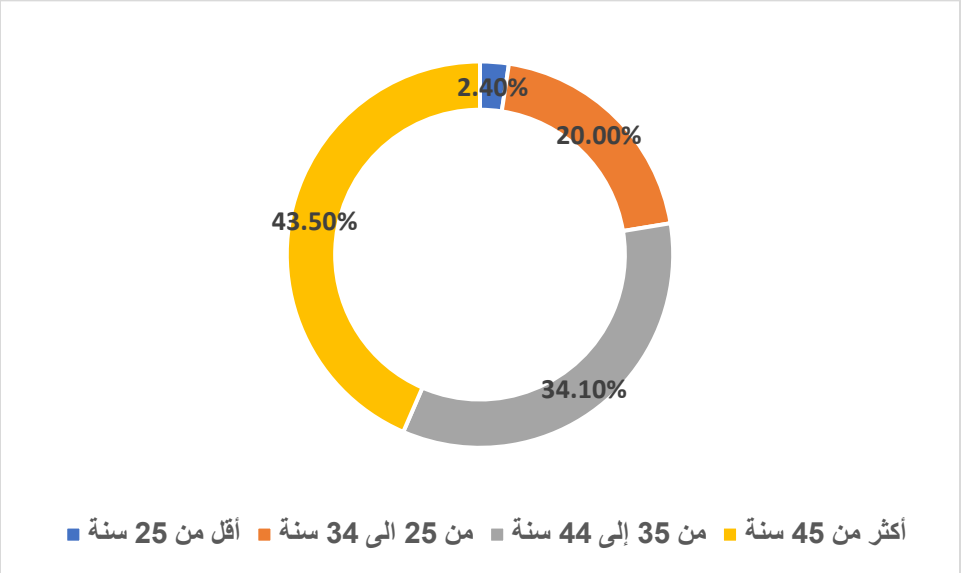
Sexe

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ذكر	*65*	*76.5*	*76.5*	*76.5*
	أنثى	*20*	*23.5*	*23.5*	*100.0*
	Total	*85*	*100.0*	*100.0*	



Age

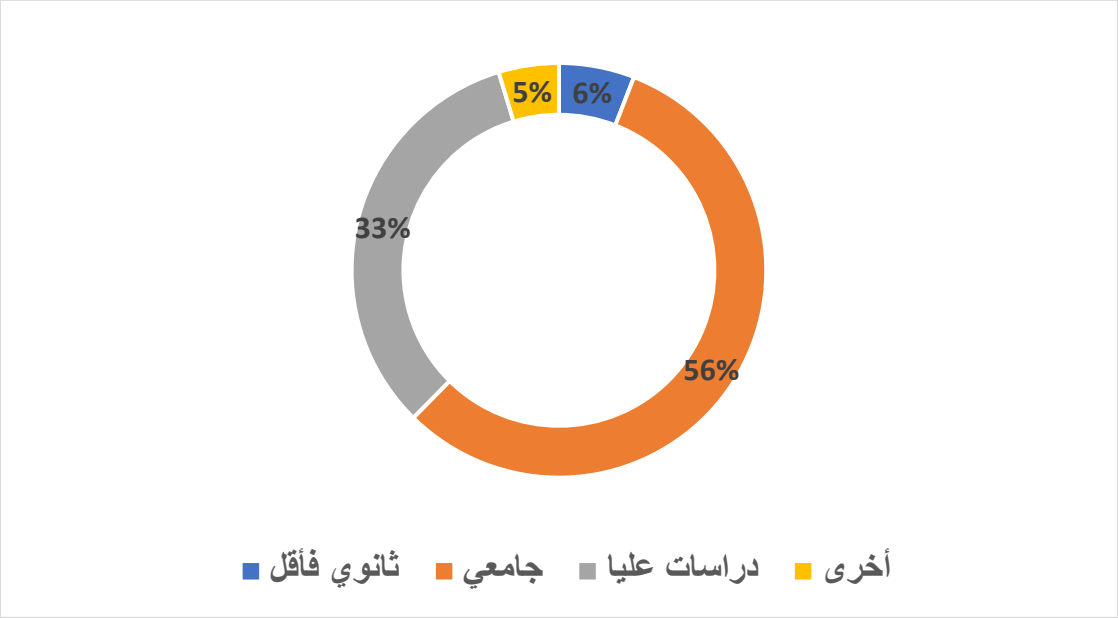
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	أقل من 25 سنة	*2*	*2.4*	*2.4*	*2.4*
	من 25 الى 34 سنة	*17*	*20.0*	*20.0*	*22.4*
	من 35 إلى 44 سنة	*29*	*34.1*	*34.1*	*56.5*
	أكثر من 45 سنة	*37*	*43.5*	*43.5*	*100.0*
	Total	*85*	*100.0*	*100.0*	



Niveau

	Frequency	Percent	Valid Percent	Cumulative Percent

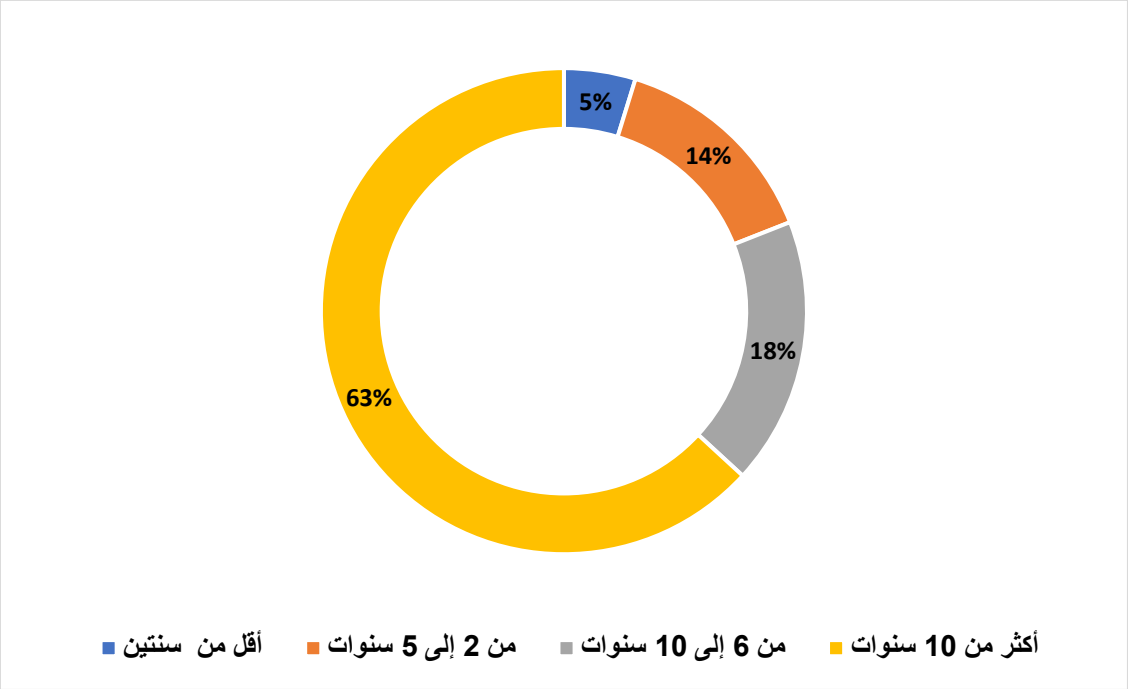
Valid	ثانوي فأقل	5	5.9	5.9	5.9
	جامعي	48	56.5	56.5	62.4
	دراسات عليا	28	32.9	32.9	95.3
	أخرى	4	4.7	4.7	100.0
	Total	85	100.0	100.0	



Exper

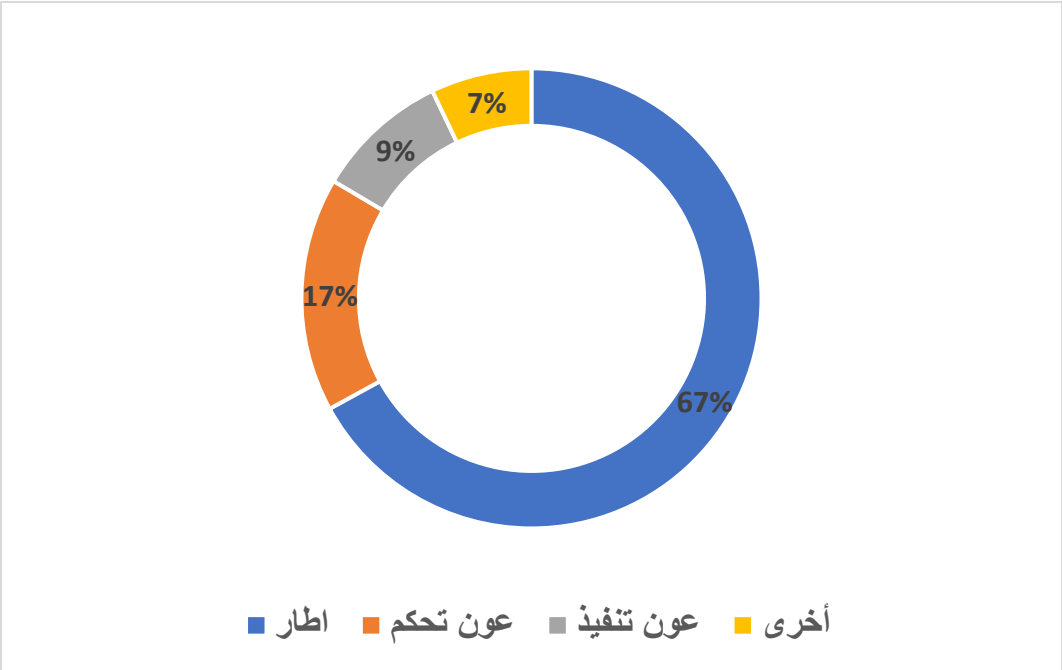
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	1.2	1.2	1.2
	أقل من سنتين	4	4.7	4.7	5.9
	من 2 إلى 5 سنوات	12	14.1	14.1	20.0
	من 6 إلى 10 سنوات	15	17.6	17.6	37.6
	أكثر من 10 سنوات	53	62.4	62.4	100.0

Total	*85*	*100.0*	*100.0*	



Fonction

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	اطار	*57*	*67.1*	*67.1*	*67.1*
	عون تحكم	*14*	*16.5*	*16.5*	*83.5*
	عون تنفيذ	*8*	*9.4*	*9.4*	*92.9*
	أخرى	*6*	*7.1*	*7.1*	*100.0*
	Total	*85*	*100.0*	*100.0*	



2. Means and Standard Deviations of the Items

	Mean	Std. Deviation
تستخدم المؤسسة أنظمة رقمية لتسجيل الحضور والغياب والإجازات.	3.60	1.197
تتم معالجة الرواتب والمزايا آليا من خلال نظام مركزي.	3.80	1.003
يتم تحديث بيانات الموظفين (العنوان، رقم الهاتف، المهارات) لحظيا.	3.84	.998
تتم معالجة طلبات الإجازات والموافقات عليها إلكترونيا دون استخدام الأوراق.	3.94	.930
تُساعد الأنظمة الرقمية في تخطيط حجم القوى العاملة بما يتوافق مع رؤية المنظمة المستقبلية.	3.84	.998
توجد وحدة رقمية لإدارة مسارات التطوير والتخطيط للتعاقب الوظيفي.	4.09	.854
تتم مواءمة أهداف الموظفين الفردية مع أهداف المنظمة من خلال بطاقة أداء متوازنة.	4.06	.761
يعتمد تقييم الأداء على التغذية الراجعة المستمرة، وليس فقط على المراجعة السنوية.	4.04	.794
تُوفر المؤسسة بوابة خدمة ذاتية سهلة الاستخدام للموظفين.	4.02	.786
تستخدم المؤسسة منصات تواصل داخلي تفاعلية (مثل أنظمة المراسلة المؤسسية)	4.02	.776
تُوفر المؤسسة تطبيق الهاتف المحمول لإدارة معاملات الموارد البشرية من أي مكان	4.02	.690
تتكامل أداة إدارة الموارد البشرية مع أنظمة المؤسسة الأخرى (المالية، المشاريع، إلخ)	4.12	.609
تطبق المؤسسة آليات صارمة لحماية البيانات الشخصية للموظفين.	4.06	.661

توفر المؤسسة سجل تدقيق لكل تعديل على بيانات الموظفين.	4.14	.693
المعلومات المنقولة عبر أدوات الموارد البشرية الرقمية واضحة ومفهومة.	4.12	.762
تساعد الأنظمة الرقمية في تقليل الأخطاء المرتبطة بنقل المعلومات يدويا.	4.05	.738
توفر الأدوات الرقمية معلومات دقيقة ومحدثة حول السياسات والإجراءات.	4.00	.900
الوصول إلى معلومات الموارد البشرية المطلوبة سهل، دون أي لبس أو تعقيد.	4.11	.859
تصل القرارات والإعلانات الإدارية إلى الموظفين فورا عبر الأنظمة الرقمية.	4.11	.845
تقلل الأدوات الرقمية من أوقات الاستجابة لطلبات الموظفين.	4.11	.845
تتم معالجة طلبات الموظفين (الإجازات، التدريب، إلخ) بسرعة أكبر من الطرق التقليدية.	4.13	.753
توفر أدوات الموارد البشرية الرقمية قنوات للتواصل التصاعدي (من الموظفين إلى الإدارة)	4.13	.813
يمكن للموظفين تقديم الاقتراحات والشكاوى إلكترونيا وتلقي الردود.	4.11	.756
تشجع الأنظمة الرقمية المناقشات المفتوحة وتبادل الأفكار بين الزملاء.	4.07	.799
تسهل المنصات الرقمية تنظيم الاجتماعات الافتراضية وجلسات العصف الذهني.	4.11	.724
تُسهم الأنظمة الرقمية في نشر المعلومات بشفافية على جميع المستويات.	4.05	.785
يستطيع الموظفون متابعة سير طلباتهم ومعاملاتهم بشفافية.	4.00	.787
تُعزز الأدوات الرقمية ثقة الموظفين في إدارة الموارد البشرية.	4.04	.794
البعد_التشغيلي	3.7941	.88655
البعد_الاستراتيجي	3.9412	.77503
البعد_التجريبي	4.0235	.67414
البعد_التقني	4.1059	.59141
المتغير_المستقل	3.9662	.61150
جودة_المعلومات	4.0676	.66747
السرعة_التوقيت	4.1137	.70063
التفاعل_التواصل	4.1029	.65271
الشفافية_الثقة	4.0275	.64900
المتغير_التابع	4.0779	.54557

3.Cronbach's Alpha Reliability Coefficients for the Study Variables

Cronbach's Alpha	عدد العبارات	المتغير
0.936	14	المستقل
0.913	14	التابع
0.953	28	الدرجة الكلية

4. Correlation of Items with Their Respective Dimension (Internal Consistency)

المتغير_المستقل		
تستخدم المؤسسة أنظمة رقمية لتسجيل الحضور والغياب والإجازات.	Pearson Correlation	.686**
	مستوى الدلالة	.000
تتم معالجة الرواتب والمزايا آليا من خلال نظام مركزي.	Pearson Correlation	.715**
	مستوى الدلالة	.000
يتم تحديث بيانات الموظفين (العنوان، رقم الهاتف، المهارات) لحظيا.	Pearson Correlation	.815**
	مستوى الدلالة	.000
تتم معالجة طلبات الإجازات والموافقات عليها إلكترونيا دون استخدام الأوراق.	Pearson Correlation	.787**
	مستوى الدلالة	.000
تُساعد الأنظمة الرقمية في تخطيط حجم القوى العاملة بما يتوافق مع رؤية المنظمة المستقبلية.	Pearson Correlation	.807**
	مستوى الدلالة	.000
توجد وحدة رقمية لإدارة مسارات التطوير والتخطيط للتعاقب الوظيفي.	Pearson Correlation	.809**
	مستوى الدلالة	.000
تتم مواءمة أهداف الموظفين الفردية مع أهداف المنظمة من خلال بطاقة أداء متوازنة.	Pearson Correlation	.794**
	مستوى الدلالة	.000
يعتمد تقييم الأداء على التغذية الراجعة المستمرة، وليس فقط على المراجعة السنوية.	Pearson Correlation	.749**
	مستوى الدلالة	.000

تُوفر المؤسسة بوابة خدمة ذاتية سهلة الاستخدام للموظفين.	Pearson Correlation	.818**
	مستوى الدلالة	.000
تستخدم المؤسسة منصات تواصل داخلي تفاعلية (مثل أنظمة المراسلة المؤسسية)	Pearson Correlation	.843**
	مستوى الدلالة	.000
تفور المؤسسة تطبيق الهاتف المحمول لإدارة معاملات الموارد البشرية من أي مكان	Pearson Correlation	.701**
	مستوى الدلالة	.000
تتكامل أداة إدارة الموارد البشرية مع أنظمة المؤسسة الأخرى (المالية، المشاريع، إلخ)	Pearson Correlation	.594**
	مستوى الدلالة	.000
تطبق المؤسسة آليات صارمة لحماية البيانات الشخصية للموظفين.	Pearson Correlation	.546**
	مستوى الدلالة	.000
توفر المؤسسة سجل تدقيق لكل تعديل على بيانات الموظفين.	Pearson Correlation	.617**
	مستوى الدلالة	.000

المتغير_التابع		
المعلومات المنقولة عبر أدوات الموارد البشرية الرقمية واضحة ومفهومة.	Pearson Correlation	.685**
	مستوى الدلالة	.000
تساعد الأنظمة الرقمية في تقليل الأخطاء المرتبطة بنقل المعلومات يدويا.	Pearson Correlation	.670**
	مستوى الدلالة	.000
توفر الأدوات الرقمية معلومات دقيقة ومحدثة حول السياسات والإجراءات.	Pearson Correlation	.763**
	مستوى الدلالة	.000
الوصول إلى معلومات الموارد البشرية المطلوبة سهل، دون أي لبس أو تعقيد.	Pearson Correlation	.530**
	مستوى الدلالة	.000
تصل القرارات والإعلانات الإدارية إلى الموظفين فورا عبر الأنظمة الرقمية.	Pearson Correlation	.620**
	مستوى الدلالة	.000
تقلل الأدوات الرقمية من أوقات الاستجابة لطلبات الموظفين.	Pearson Correlation	.793**

	مستوى الدلالة	.000
تتم معالجة طلبات الموظفين (الإجازات، التدريب، إلخ) بسرعة أكبر من الطرق التقليدية.	Pearson Correlation	.798**
	مستوى الدلالة	.000
توفر أدوات الموارد البشرية الرقمية قنوات للتواصل التصاعدي (من الموظفين إلى الإدارة)	Pearson Correlation	.835**
	مستوى الدلالة	.000
يمكن للموظفين تقديم الاقتراحات والشكاوى إلكترونيا وتلقي الردود.	Pearson Correlation	.767**
	مستوى الدلالة	.000
تشجع الأنظمة الرقمية المناقشات المفتوحة وتبادل الأفكار بين الزملاء.	Pearson Correlation	.719**
	مستوى الدلالة	.000
تسهل المنصات الرقمية تنظيم الاجتماعات الافتراضية وجلسات العصف الذهني.	Pearson Correlation	.617**
	مستوى الدلالة	.000
تُسهم الأنظمة الرقمية في نشر المعلومات بشفافية على جميع المستويات.	Pearson Correlation	.611**
	مستوى الدلالة	.000
يستطيع الموظفون متابعة سير طلباتهم ومعاملاتهم بشفافية.	Pearson Correlation	.588**
	مستوى الدلالة	.000
تُعزز الأدوات الرقمية ثقة الموظفين في إدارة الموارد البشرية.	Pearson Correlation	.603**
	مستوى الدلالة	.000

5. Normality Test Result

	Kolmogorov-Smirnov[a]		
	Statistic	df	Sig.
المتغير_المستقل	.287	85	.154
المتغير_التابع	.278	85	.085
كل_الدراسة	.262	85	.061

6.Correlation between the Independent Variable and the dependent variable

		المتغير_المستقل
المتغير_التابع	Pearson Correlation	0.725**
	مستوى الدلالة	0.000
	N	*85*

7.The correlation between the dimensions of the independent variable and the dependent variable

		المتغير_المستقل
جودة_المعلومات	Pearson Correlation	0.585**
	مستوى الدلالة	0.000
السرعة_التوقيت	Pearson Correlation	0.628**
	مستوى الدلالة	0.000
التفاعل_التواصل	Pearson Correlation	0.663**
	مستوى الدلالة	0.000
الشفافية_الثقة	Pearson Correlation	0.492**
	مستوى الدلالة	0.000

8.Impact of the Independent Variable on the Dependent Variable: Simple Linear Regression Analysis

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate

1	0.725[a]	0.526	0.520	0.37802

a. Predictors: (Constant), المتغير_المستقل

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	13.142	1	13.142	91.966	0.000
	Residual	11.861	83	.143		
	Total	25.003	84			

a. Dependent Variable: المتغير_التابع

b. Predictors: (Constant), المتغير_المستقل

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	الأثر
		B	Std. Error	Beta			
1	(Constant)	1.512	.271		5.589	0.000	
	المتغير_المستقل	.647	.067	.725	9.590	0.000	يوجد

a. Dependent Variable: المتغير_التابع

9.The effect of the dimensions of the independent variable on the dependent variabale (multiple regression)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.756[a]	0.572	.551	.36576

a. Predictors: (Constant), البعد_التقني, البعد_التشغيلي, البعد_التجريبي, البعد_الاستراتيجي

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	*14.300*	*4*	*3.575*	*26.722*	0.000
	Residual	*10.703*	*80*	*.134*		
	Total	*25.003*	*84*			

a. Dependent Variable: المتغير_التابع

b. Predictors: (Constant), البعد_التقني, البعد_التشغيلي, البعد_التجريبي, البعد_الاستراتيجي

Coefficients[a]

Model		Unstandardized CoefficientsA		Standardized Coefficients	t	Sig.	الأثر
		B	Std. Error	Beta			
1	(Constant)	*1.096*	*.300*		*3.655*	0.000	
	البعد_التشغيلي	*.137*	*.075*	*.223*	*1.818*	0.073	لا يوجد
	البعد_الاستراتيجي	*.112*	*.099*	*.159*	*1.133*	0.261	لا يوجد
	البعد_التجريبي	*.108*	*.099*	*.134*	*1.093*	0.278	لا يوجد
	البعد_التقني	*.386*	*.083*	*.419*	*4.663*	0.000	يوجد

a. Dependent Variable: المتغير_التابع

10.Differences in the respondents' answers

Differences in the study variables based on gender

Table 14: Results of one-way ANOVA analysis of respondents' opinions regarding the study variables according to gender

Group Statistics						
	Sexe	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**	**Discrepancies**
Independent variable	**Male**	***65***	***3.9920***	***.60180***	***.07464***	**No differences**
	Female	***20***	***3.8823***	***.65083***	***.14553***	
Independent variable	**Male**	***65***	***4.0865***	***.50437***	***.06256***	**No differences**
	Female	***20***	***4.0500***	***.67675***	***.15133***	

Differences in the study variables based on age group

Table 15: Results of one-way ANOVA analysis of respondents' opinions regarding the study variables according to age group

ANOVA		ANOVA	
	Sum of Squares		**Sum of Squares**

Independent variable dependent variable	Between Groups	Independent variable	Between Groups	Independent variable
	Within Groups	17	Within Groups	.65921
	Total	29	Total	.64977
	Between Groups	dependent variable	Between Groups	dependent variable
	Within Groups	85	Within Groups	.61150
dependent variable ANOVA Independent variable	Total	2	Total	.35355
		ANOVA		ANOVA
	Sum of Squares		Sum of Squares	
	Between Groups	Independent variable	Between Groups	Independent variable
	Within Groups	85	Within Groups	.54557

Differences in the study variables based on educational level

Table 16: Results of one-way ANOVA analysis of respondents' opinions regarding the study variables according to educational level

ANOVA							
		Sum of Squares	Df	Mean Square	F	Sig.	Discrepancies
Independent variable	Between Groups	1.754	3	.585	1.597	0.197	No differences
	Within Groups	29.657	81	.366			
	Total	31.411	84				
dependent variable	Between Groups	.122	3	.041	.132	0.941	No differences
	Within Groups	24.881	81	.307			
	Total	25.003	84				

Differences in the study variables based on years of experience

Table 17: Results of one-way ANOVA analysis of respondents' opinions regarding the study variables according to professional experience

ANOVA							
		Sum of Squares	Df	Mean Square	F	Sig.	Discrepancies
Independent variable	Between Groups	1.078	3	.359	.948	0.421	No differences
	Within Groups	30.309	80	.379			
	Total	31.387	83				
	Between Groups	1.688	3	.563	1.933	0.131	No differences

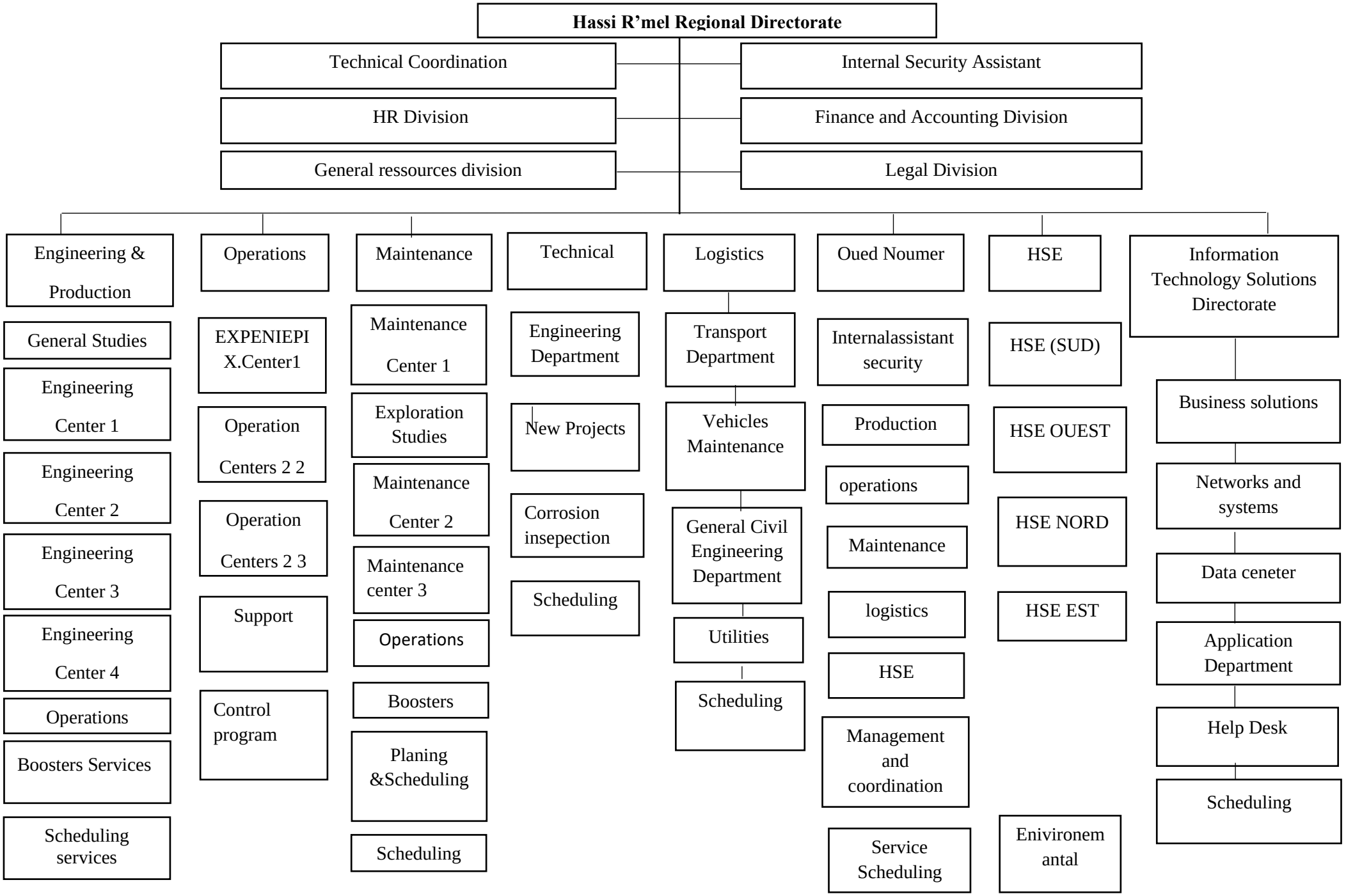
dependent variable	Within Groups	23.285	80	.291			
	Total	24.973	83				

Differences in the study variables based on job position

Table 18: of Results of one-way ANOVA analysis of respondents' opinions regarding the study variables according to job position

ANOVA							
		Sum of Squares	Df	Mean Square	F	Sig.	Discrepancies
Independent variable	Between Groups	2.595	3	.865	2.431	0.071	No differences
	Within Groups	28.816	81	.356			
	Total	31.411	84				
dependent variable	Between Groups	1.017	3	.339	1.145	0.336	No differences
	Within Groups	23.985	81	.296			
	Total	25.003	84				

Appendix C– Organizational Chart – Sonatrach (Hassi R’Mel)


Hassi R'mel Regional Directorate
Technical Coordination
Internal Security Assistant
HR Division
Finance and Accounting Division
General ressources division
Legal Division
Engineering & Production
General Studies
Engineering Center 1
Engineering Center 2
Engineering Center 3
Engineering Center 4
Operations
Boosters Services
Scheduling services
Operations
EXPENIEPI X.Center1
Operation Centers 2 2
Operation Centers 2 3
Support
Control program
Maintenance
Maintenance Center 1
Exploration Studies
Maintenance Center 2
Maintenance center 3
Operations
Boosters
Planing &Scheduling
Scheduling
Technical
Engineering Department
New Projects
Corrosion insepection
Scheduling
Logistics
Transport Department
Vehicles Maintenance
General Civil Engineering Department
Utilities
Scheduling
Oued Noumer
Internalassistant security
Production
operations
Maintenance
logistics
HSE
Management and coordination
Service Scheduling
HSE
HSE (SUD)
HSE OUEST
HSE NORD
HSE EST
Enivironemantal
Information Technology Solutions Directorate
Business solutions
Networks and systems
Data ceneter
Application Department
Help Desk
Scheduling