

**Dissertation Submitted in Partial Fulfillment of the Requirements
for a Master's Degree**
Specialty: Information Systems Governance

THEME

**The contribution of integrating
information systems to the improvement
of the Company's performance.**

Case study:

Port Corporation of Algeria (EPAL)

Presented by:

IKRAM MAHMOUDI

Supervised by:

Mrs

SAMIA AHMEDYAHIA

Associate professor 'A'

Academic year

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Dedications

أهدي بكل حب بحث تخرُّجي

إلى من لا يضاھيھما أحد في الكون، إلى من أمرنا الله ببرِّھما، إلى من بذلا الكثير، وقَدَّما ما لا يمكن أن یردّ،
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{ That man can have nothing but what he strives for, That (the fruit of) his striving will soon come in sight. }

(Surah An-Najm, 39-40)

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Abbreviations list

ICT	Information and Communication Technologies
BPM	Business Process Management
KPI	key performance Indicator
CRM	Customer Relationship Management
DMS	Document Management System
IIS	Integrated Information Systems
EPAL	Port Corporation of Algeria
IPS	Intrusion Prevention System
UTM	Unified Threat Management
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name System
IS	Information System
TPS	Transaction Processing Systems
PC	Personal Computers
UAB	Autonomous University of Barcelona
MIS	Management Information Systems
ERP	Enterprise Resource Planning
AI	Artificial Intelligence
EIS	Executive Information System
DSS	Decision Support System
AI	Artificial Intelligence

Abstract

In the modern age of technology, information systems are the backbone for innovative companies, enabling efficiency, creativity, and strategic decision-making. These systems have evolved from simple data processing tools to intelligent, linked systems that provide competitive advantages. This study examines how information systems can reduce costs, improve organizational effectiveness, and enhance employee productivity. The purpose of the study was to demonstrate their significant contribution to the Company's performance through a case study at the Port corporation of Algeria. We used a combination of qualitative method (interview) and quantitative method questionnaire. The results confirmed the importance of integrating information systems, highlighting their ability to boost employee satisfaction and elevate overall performance aspects within the company.

Keywords: Information systems, Innovative companies, Efficiency, Strategic decision-making, Competitive advantages, Cost reduction, Organizational effectiveness, Employee productivity, Company performance, Case study

Résumé

À l'ère moderne de la technologie, les systèmes d'information sont le pilier des entreprises innovantes, permettant l'efficacité, la créativité et la prise de décisions stratégiques. Ces systèmes ont évolué de simples outils de traitement de données à des systèmes intelligents et interconnectés offrant des avantages compétitifs. Cette étude examine comment les systèmes d'information peuvent réduire les coûts, améliorer l'efficacité organisationnelle et augmenter la productivité des employés. L'objectif de l'étude était de démontrer leur contribution significative à la performance de l'entreprise à travers une étude de cas à la Société des ports d'Algérie. Nous avons utilisé une combinaison de méthode qualitative (entretien) et de méthode quantitative (questionnaire). Les résultats ont confirmé l'importance de l'intégration des systèmes d'information, mettant en évidence leur capacité à augmenter la satisfaction des employés et à améliorer les aspects de performance globale au sein de l'entreprise.

Mots-cles : Systèmes d'information, Entreprises innovantes, Efficacité, Prise de décision stratégique, Avantages compétitifs, Réduction des coûts, Efficacité organisationnelle, Productivité des employés, Performance de l'entreprise.

ملخص

في العصر الحديث للتكنولوجيا، تعتبر نظم المعلومات عمود الدعامة للشركات الابتكارية، حيث تمكنها من الكفاءة والإبداع واتخاذ القرارات الاستراتيجية. فقد تطورت هذه الأنظمة من أدوات بسيطة لمعالجة البيانات إلى أنظمة ذكية مترابطة توفر ميزات تنافسية. تهدف هذه الدراسة إلى فحص كيف يمكن لنظم المعلومات تقليل التكاليف وتحسين كفاءة التنظيم وزيادة إنتاجية الموظفين. كان الغرض من الدراسة هو إظهار المساهمة الكبيرة لهذه النظم في أداء الشركة من خلال دراسة حالة في شركة موانئ الجزائر. لقد استخدمنا مزيجًا من الطريقة النوعية (المقابلة) والطريقة الكمية (الاستبيان). أكدت النتائج على أهمية دمج نظم المعلومات، مسطرة الضوء على قدرتها على زيادة رضا الموظفين ورفع جوانب الأداء الشامل داخل الشركة

الكلمات المفتاحية:

نظم المعلومات، شركات مبتكرة، الكفاءة، اتخاذ القرارات الاستراتيجية، المزايا التنافسية، خفض التكاليف، فعالية التنظيم، إنتاجية الموظفين، أداء الشركة

General Introduction

General Introduction

General Introduction

In recent years, the Algerian business environment has experienced a notable trend towards the integration of information systems to improve organizational performance. This shift is particularly significant within the realm of information systems governance, where effective management of technology resources has become crucial for achieving business objectives.

This master dissertation aims to explore the contribution of integrating information systems to the improvement of the Company's performance.

The choice of this topic was motivated by the growing recognition of the importance of technology integration in driving operational efficiency and strategic decision-making within Algerian companies, and their need to leverage information systems integration as a strategic tool to improve their overall performance in an increasingly competitive market landscape. By exploring the complex dynamics of this relationship, we aim to shed light on the underlying mechanisms through which information systems integration contribute to the various dimensions of Company's performance.

Furthermore, this research seeks to contribute to the existing body of knowledge in the field of information systems governance by providing insights into the specific challenges and opportunities faced by Algerian companies in their quest to effectively integrate information systems to improve performance outcomes.

The objective of our work is to demonstrate the contribution of integrating information systems to the improvement of the Company's performance by answering the following question:

How can information systems integration contribute to the improvement of the Port Corporation's performance?

This problem raises the following sub-questions:

- How have information systems evolved over time, and their roles in various contexts?
- What are the different types of performance?
- What measurable methods can be used to assess the company's performance?

General Introduction

In order to address these questions, it appears necessary to consider the following hypotheses:

- **Hypothesis 01: Integrating information systems within EPAL can lead to cost reduction.**
- **Hypothesis 02: Integrating information systems within EPAL contributes to a better-organized and more effective operations.**

Hypothesis 03: The integration of information systems improves the productivity of employees within EPAL.

In order to confirm or disprove the proposed hypotheses, we will conduct a bibliographical search, encompassing books, scholarly articles, and a rich webography. For the practical part, we will employ both qualitative methods (interview) and quantitative methods (questionnaire) in our research approach. These methodologies will enable us to explore and understand the contribution of integrating information systems to the improvement of the Company's performance.

The dissertation will be structured into several parts, these parts will include:

➤ **The first chapter:** The First section, provides an overview of information systems, we begin with a brief history, followed by a clear definition and an examination of their components, we then categorize different types of information systems and discuss their pivotal role in organizational operations.

The second section presents the concept of company's performance, we define performance and its different types, we outline its objectives, then we discuss various measures used to assess it. Finally, we will discuss the relationship between information systems and company's performance, how the integration of information systems contributes and improve the overall company's performance.

➤ **The second chapter:** The First section, it gives an introduction to the Port Corporation of Algiers, providing an overview of its operations and structure then it explains the methodology used in the research, which involves both qualitative methods "interview" and quantitative method such as questionnaire. This section sets the stage for our survey on the relationship between information systems and company's performance by using these approaches to gain a deeper understanding of the topic. On the other hand in the Second section we showcase the practical application of the research by analyzing the results of the research data.

**CHAPTER I: INFORMATION SYSTEMS COMPANY'S
PERFORMANCE**

Chapter I: Information systems and Company's performance

Chapter I: Information systems and Company's performance

In today's rapidly evolving business environment, the role of information systems in enhancing company's performance cannot be overstated. Information systems are instrumental in driving efficiency, productivity, and profitability within organizations. By facilitating seamless data management, streamlined operations, and improved decision-making processes, information systems contribute significantly to the overall performance of companies across various sectors. In this chapter, we explore the multifaceted ways in which information systems positively contribute the company's performance, highlighting their indispensable role in achieving organizational success.

Section 01: Information systems

In order to understand the current, I.S function, it is important to be aware of its evolution. This is exactly the purpose of this first section. We will explore the significant changes that have occurred in information systems throughout five distinct periods. This comprehensive exploration will provide a solid foundation for understanding how information systems have developed and their critical roles within organizations.

1. History of Information Systems

The evolution of information systems has been deeply intertwined with technological advancements, organizational needs, and societal changes. From the emergence of early data processing systems to the contemporary landscape of cloud computing, big data analytics, and artificial intelligence, the journey of information systems reflects a continuum of innovation and adaptation. Understanding this evolution is essential for grasping the current landscape of information systems and anticipating future trends and challenges.

1.1. The First period (1960 to 1970) ¹

During the first period from 1960 to 1970, the emergence of the Information Systems (IS) field was marked by several key developments. It began with the introduction of the first computers, leading to the establishment of specialized IS groups within organizations.

¹ “Seifedine Kadry” *May 2014 Systems Theory: Perspectives, Applications and Developments* (pp.197-208)
Edition: 1 Chapter: 10 Publisher: Nova Publisher Editors: Francisco Miranda,

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This era witnessed a shift from disparate processing functions to the consolidation of data processing operations, primarily focused on automating basic business processes.

Technological advancements, such as integrated circuits and microprocessors, along with innovations in database technology and data communications, contributed to improvements in hardware and software cost/performance ratios. These developments facilitated networking and extended data transmission beyond computer rooms.

Overall, this period witnessed significant advancements in information technology, including the establishment of standardized platforms, the introduction of database technology, and the evolution of networking, all of which contributed to improved computing cost/performance ratios.

1.2 The Second Period (1970 to 1980) ¹

Between 1970 and 1980, there was a big change in how organizations used computers, mainly because of personal computers (PCs) becoming more common and cheaper. PCs meant that computing power was spread out across organizations, not just in one big mainframe. More people in different parts of organizations started using computers, not just in accounting or engineering.

At the same time, organizations started to organize how they used computers more seriously. They set up groups called steering committees to listen to what computer users needed and to involve them in making new systems. Some of the people using computers even became leaders in these projects.

But even with all this activity, there wasn't a clear plan for how systems fit into the bigger picture of what the organization was trying to do. Instead, each department or group did their own thing, which sometimes meant they weren't working toward the same goals as the rest of the organization.

1.3 The Third period (1980 to 1990) ²

During this period, the widespread adoption of personal computing led to a shift towards departmental computing, where individual business units began acquiring their own hardware

¹ “*Seifedine Kadry*” *IBID*

² “*Seifedine Kadry*” *IBID*

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and software. This decentralization trend presented challenges such as data incompatibility and connectivity issues across functional departments. To address these challenges, organizations witnessed the significant growth of Information Systems (IS) departments, overseen by Chief Information Officers (CIOs), tasked with managing organization-wide data and developing new systems. Companies also began aligning their IS strategies with corporate objectives and increasingly sought solutions from external vendors. The era was characterized by rapid advancements in PC hardware, software, and networking technologies. While the Internet began its development in this era, its transformative impact on the field of information systems became more apparent in subsequent periods.

1.4 The Fourth period (1990 to 2000)¹

During the 1990s, the commercialization of the Internet revolutionized the business environment and information systems (IS) technology. Organizations adapted their strategies to leverage the Internet for global communication and customized customer services. However, managing distributed technologies and personnel, along with challenges from outsourcing and the open-source community, posed hurdles for IS managers. Organizations shifted towards networked structures, supported by advancements like intranets and extranets.

Search engines like Google and the rise of social media transformed information retrieval and interpersonal interaction.

1.5 The Fifth period (2000 to present)

Significant advancements have been made in the development of information systems to assist individuals in their tasks, resulting in a broad array of applications and systems being implemented. Organizations primarily concentrate on creating, utilizing, and assessing utilitarian information systems geared towards enhancing both individual and organizational performance. ¹

The development of information systems has resulted in highly efficient systems that improve business performance and offer competitive advantages to enterprises. These advancements, such as integrating artificial intelligence for forecasting business performance, are enabled by simulation and modeling techniques using stored database information.

¹ “*Seifedine Kadry*” *OP.CIT*

Chapter I: Information systems and Company's performance

Notable functional enhancements in information systems include customer relationship management, human resource management, business intelligence, and electronic commerce. These systems facilitate customer interaction, feedback submission, workforce monitoring, simplified payroll generation, data analysis, and online commerce.

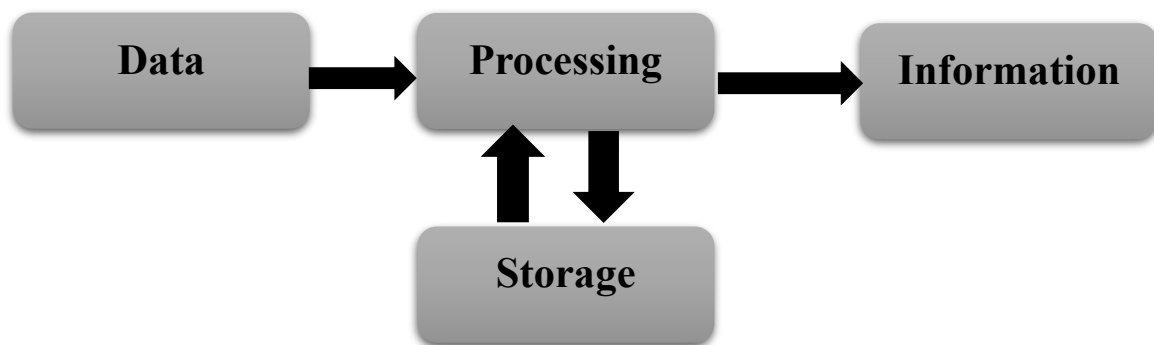
Technical advancements include adopting open programming to integrate new ideas, effectively using object-oriented information in system development, and implementing system architecture within organizations.¹

2. Definition of information systems

Information systems (IS) is an interconnected components that used to collect, store, process, and transmit data and digital information. It includes hardware, software, data, people, and processes that work together to transform raw data into useful information.

The figure titled "The Information Systems Data Processing Cycle" illustrates the flow of data through various stages within an information system.

Figure 1. The Information Systems Data Processing Cycle



Source : <https://quliyevafidan1977.medium.com/information-and-data-efc9c4aaf3>,

Many Authors have made different attempts to define information systems:

¹ David Mwendwa, *Information Systems Infrastructure: Evolution and Trends*, October 26, 2017

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“Information systems is an umbrella term used to describe the various networks, hardware, and software that people and businesses use to make sense of data and put it to use. In addition to interpreting data, information systems also collect, process, and distribute it.”¹

“The whole Web is an information system. The individual Web sites are information systems. The digital applications in offices, factories, and universities are information systems. The smartphones with apps are information systems, too. Less tangibly, a supply chain is an information system. The organization of any enterprise is also an information system.”²

“The component that helps organizations achieve their goals, such as increasing profits or improving customer service”³.

These three definitions highlight two distinct aspects of information systems, the components and their organizational role. Each aspect needs to be closely examined.

3. The Components of Information Systems

Information systems comprise various elements that can be broadly classified into two categories: technology components (hardware, software, data) and non-technology components (people, and processes). These components play distinct roles in the functionality of the system, contributing to its efficiency and effectiveness.

3.1 Technology components

Technology components form the backbone of functionality, enabling the processing, storage, and transmission of data within organizations. These components include hardware, software, and data, collectively shaping the technical side that supports organizational operations and how information systems function. Each of these technology components will be examined individually.

¹ *What Are Information Systems, UAB Universitat autònoma de Barcelona Online Degrees, August 28, 2023*

² *Cheng Hsu, Information Systems: The Connection of People and Resources for Innovation — A Textbook, Edition: 1st, Publisher: World Scientific Publishers, March 2013*

³ *Ralph M. Stair and George W. Reynolds, Fundamentals of Information Systems, Fifth Edition Chapter 1 An Introduction to Information Systems in Organizations*

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3.1.1 Hardware

“The concept of hardware resources includes all physical devices and materials used in information processing. Specifically, it includes not only machines, such as computers and other equipment, but also all data media, that is, tangible objects on which data are recorded, from sheets of paper to magnetic or optical disks.”¹

3.1.2 Software

“Systems software are programs that manage the resources of the computer system and simplify applications programming. They include software such as the operating system, database management systems, networking software, translators, and software utilities.”²

3.1.3 Data

“Data is a raw form of knowledge and, on its own, doesn't carry any significance or purpose. In other words, you have to interpret data for it to have meaning. Data can be simple—and may even seem useless until it is analyzed, organized, and interpreted.”³

3.2 non-technology components

Non-technology components are integral elements of information systems (IS) that are not directly related to hardware or software. These components include procedures, people. these components are crucial as they shape how information systems are utilized and managed within organizations.

3.2.1 Procedures

“Are The instructions for combining the above components to process information and generate the desired output.”⁴

¹ O'Brien, J. A, George M. Marakas. (2003). Management Information Systems.P32. McGraw-Hill/Irwin.

² <https://www.umsl.edu/~joshik/msis480/chapt05.htm> . Accessed 26/02/2024 at 9:09PM

³ ByronGalbraith.JUN05, 2023.Data vs. Information: What'sthe Difference.Bloomfire.

<https://bloomfire.com/blog/data-vs-information/>, Accessed 26/02/2024 at 11:30PM

⁴ R. Kelly Rainer, Brad Prince. August 2021. Introduction to Information Systems, 9th Edition.

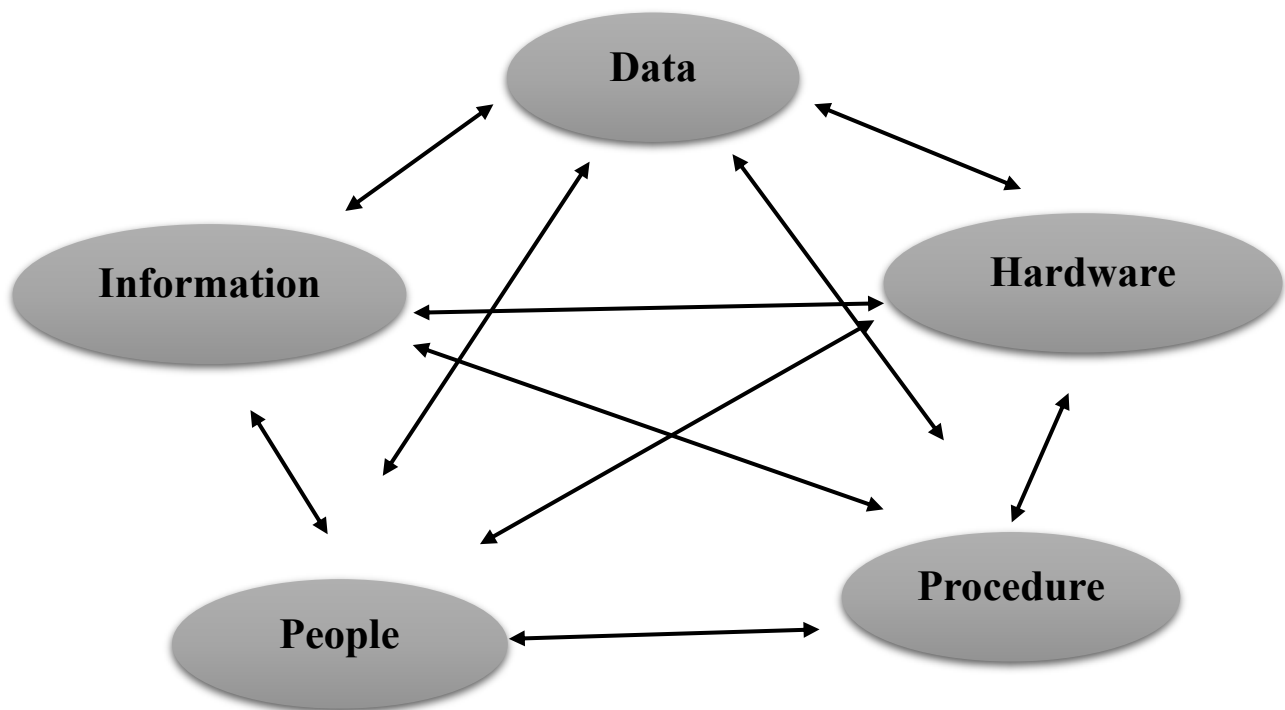
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3.2.2 People

“People are involved in information systems in just about every way. People imagine information systems, people develop information systems, people support information systems, and, perhaps most importantly, people use information systems.”¹

The figure titled "Information System Components" depicts the interrelated elements that make up an information system. It includes data, hardware, procedure, people, and information, showing how each component interacts with the others.

Figure 2. Information Systems components



Source: <https://panitiaictsemekar.blogspot.com/2011/06/interrelations-betweeninformation.html>

¹ David Bourgeois (2019) ,Chapter 9: The People in Information Systems” , *Information Systems for Business and Beyond*, <https://ecampusontario.pressbooks.pub/informationssystemscdn/chapter/1-6-people-information-systems/> Accessed 27/02/2024 at 1:55AM

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4. Types of Information Systems

Within the realm of information systems, various types exist, each designed to serve specific functions that align with organizational requirements and objectives. Therefore, a thorough understanding of the different types of information systems is essential for organizations to leverage technology effectively and achieve their strategic goals.

4.1 Management Information Systems (MIS)¹

Management Information Systems (MIS) are a category of computer-based information systems designed to gather and process data from various sources to assist decision-making at the managerial level. MIS provide information in the form of predefined reports and displays to support business decision-making. The next level in the organizational hierarchy consists of low-level managers and supervisors. This level includes computer systems intended to aid operational management in monitoring and controlling transaction processing activities carried out at the clerical level. MIS utilize data collected by Transaction Processing Systems (TPS) to provide supervisors with necessary control reports. According to Hasan, Y., a management information system is a type of information systems that takes internal data from the system and condenses it into meaningful and useful formats as management reports to support management activities and decision-making.

4.2 Transaction Processing Systems (TPS)²

Are integral to the operations of many organizations. They handle high volumes of repetitive transactions efficiently. TPS primarily manage data related to daily business activities like sales, inventory, and orders. These systems are automated, following predefined procedures to ensure accurate and timely processing, crucial for smooth business functioning. TPS finds applications across diverse sectors like retail, banking, healthcare, and manufacturing.

¹ "Yaser Hasan Al-Mamary", "Alina Shamsuddin", and "Nor Aziati", August 2014, *The Role of Different Types of Information Systems in Business Organizations*, *International Journal of Research (IJR)*, Volume-1, Issue-7

² "Emma Hayes", August 6, 2023, *10 Different Types of Information Systems*, *History-Compute*, <https://history-computer.com/different-types-of-information-systems-explained-in-plain-english/>, Accessed 27/02/2024 at 6:30PM

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A TPS comprises input devices (e.g., barcode scanners, point-of-sale terminals), data processing software, and output devices (e.g., printers, electronic displays). It can operate independently or integrate with other systems like Enterprise Resource Planning (ERP) systems.

4.3 Customer Relationship Management Systems (CRM)¹

Operational CRM systems enhance front-office operations, covering direct customer interactions like sales, marketing, and service. These systems include two key components: customer-facing applications and customer-touching applications. Operational CRM systems provide the following benefits:

- Facilitate streamlined, personalized marketing, sales, and service efforts.
- Offer comprehensive, 360-degree insights into individual customers.
- Equip sales and service staff with extensive customer interaction histories across all touchpoints within the organization.

4.4 Office automation system (OAS)²

An office automation system refers to an information system designed to streamline various administrative tasks, including documentation, data recording, and office transactions. This system encompasses both managerial and clerical activities, aiming to enhance efficiency and productivity in the workplace. Key components of an office automation system include email, voice mail, and word processing tools, among others.

4.5 Expert system (ES)³

An expert system is a type of computer program that use artificial intelligence (AI) techniques to replicate the judgment and actions of a human expert or an organization with specialized knowledge in a specific domain.

These systems are typically designed to support human experts rather than entirely replace them. They use a knowledge base to store accumulated experience and facts, which are then

¹ "Rainer Jr", "R. K., Prince", "B., & Cegielski, C". November 25, 2013. *Introduction to Information Systems Supporting and Transforming Business*. John Wiley & Sons.

² "Sritoma Mukherjee". 14 July 2022. *The 6 Types of Information Systems and Their Applications*. Emeritus. <https://emeritus.org/in/learn/the-6-types-of-information-systems-and-their-applications/>. Accessed 27/02/2024 at 6:50PM

³ "Ben Lutkevich", expert system. TechTarget. <https://www.techtarget.com/editorial/>. Accessed 27/02/2024 at 7:11PM

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combined with an inference or rules engine. This engine contains a set of rules that govern how the knowledge base is applied to situations presented to the program.

4.6 Executive information systems (EIS)¹

An executive information system (EIS) serves as a decision support system (DSS) specifically designed to assist senior executives in their decision-making process. Its primary function is to facilitate easy access to critical data essential for achieving strategic objectives within an organization. Typically, an EIS features a user-friendly interface with graphical displays, improving accessibility and usability for executives.

Executive information systems are helpful tools used in different types of organizations, enabling the monitoring of enterprise performance and the identification of both opportunities and challenges.

4.7 Decision Support Systems (DSS)²

Decision Support Systems (DSS) are computer-based systems designed to assist decision makers in utilizing data and models to identify and resolve problems, as well as to make decisions.

4.8 Document Management System (DMS)

The term DMS refers to a document management system that monitor documents throughout their entire life cycle, from generation to storage ³. Odošaić defines a DMS as an information system that captures, manages, and stores data. The primary goal of a DMS is to make it user-friendly and allow information to be accessible quickly and effectively. It automates document flow and allows for long-term storage. ⁴

¹ "Margaret Rouse." 12 September, 2022. *Executive Information System*. Techopedia . <https://www.techopedia.com/definition/1016/executive-information-system-eis> . Accessed 27/02/2024 at 7:22PM

² "Marko Bohanec". December 2001. What is Decision Support. ResearchGate. https://www.researchgate.net/publication/248421433_What_is_Decision_Support . Accessed 27/02/2024 at 7:33PM

³ Hrašovec, J. (2011). *Implementation of the electronic document system in Pošta Slovenije d.o.o. Maribor: Faculty of Electrical Engineering, computer science and informatics*

⁴ Odošaić, E. (2016). *Dokumentni sistemi in njihova uporaba v slovenskih občinah*. Ljubljana: Fakulteta za družbene vede.

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5. The Role of Information Systems

Information systems have transformed the operational landscape of companies. Through task and process automation, they enable companies to save valuable time and resources. Moreover, these systems enhance communication channels between companies, customers, suppliers, and employees. Their significance lies in their ability to efficiently manage company operations and provide accurate, current information, aiding in better decision-making. Overall, information systems are essential tools for companies to streamline operations and drive informed decision-making. Through strategic implementation and utilization of information systems, companies can enhance productivity, performance, and gain a competitive edge in today's dynamic business environment.

5.1 Operational roles¹

Information Systems are the most basic tasks that information systems can perform, such as data entry, data processing, data storage, and data retrieval.

5.2 Strategic role²

Information systems are vital strategic assets in organizations, supporting business operations and decision-making. They enhance the image of information services, contribute to overall operations, and provide a competitive advantage through strategic development aligned with corporate initiatives.

5.3 Information Storage³

Information systems play a key role by storing various data efficiently, such as event details, communications, documents, and changes over time. Without these systems, finding specific information manually would be time-consuming. With a good information system, data is organized smartly for easy access. This helps organizations understand how their actions impact business and aids in planning and budgeting.

¹ *Roles of information system. (18 March 2023).*
[ceopedia. https://ceopedia.org/index.php/Roles_of_information_system](https://ceopedia.org/index.php/Roles_of_information_system). Accessed 28/02/2024 at 6:48PM

² "Mark Gil Anthony Rulog." (20 mars 2014). *The Strategic Role of Information System*. <https://prezi.com/35-joxt0i5r/the-strategic-role-of-information-system/>. Accessed 29/02/2024 at 01:26AM

³ *Reasons Why Information Systems Are Important for Business Today* <https://www.ecpi.edu/blog/reasons-why-information-systems-are-important-for-business-today>. Accessed 29/02/2024 at 01:34AM

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5.4 Supporting business processes¹

Information systems have a significant impact on supporting business processes and operations through:

- Recording customer purchases: Capturing transaction details.
- Managing inventories effectively: Optimizing stock levels.
- Tracking employee payments accurately: Ensuring payroll precision.
- Analyzing sales trends for informed decision-making: Evaluating market patterns.

5.5 Supporting decision-making²

The role of information systems in supporting decision-making involves utilizing computer communications, data, documents, knowledge, and models to effectively solve problems and make informed decisions. These systems enable individuals to access and analyze relevant information, facilitating the decision-making process across various domains.

Section 02: Company's performance

"In the business field, the slogan today is very clear and well-defined: it is necessary to perform in order to ensure the survival and longevity of the organization, and furthermore to increase its competitive advantage, especially in this era marked by intensified competition, globalization, and the internationalization of markets".³

Performance is a multifaceted concept that encompasses different dimensions in its definition and various measurement indicators, as it is a matter of perception and not all stakeholders perceive it in the same way. Additionally, it is relative to the company's vision, strategy, and objectives.⁴

1. Definition of Performance

As we delve into the concept of performance, it encompasses crucial dimensions for organizational success.

¹ Vital roles of Information System in Business. <https://qsstudy.com/vital-roles-of-information-system-in-business/>. Accessed 29/02/2024 at 01:43AM

² "Daniel J. Power», (2002). University of Northern Iowa. *Decision Support Systems: Concepts and Resources for Managers*. Quorum Books

³ "Issor, Z». (2017). *Corporate performance: A complex concept with multiple dimensions*. In *Projectics / Proyéctica / Projectique*. p (95).

⁴ "Issor, Z». (2017). *ibid*. p (102).

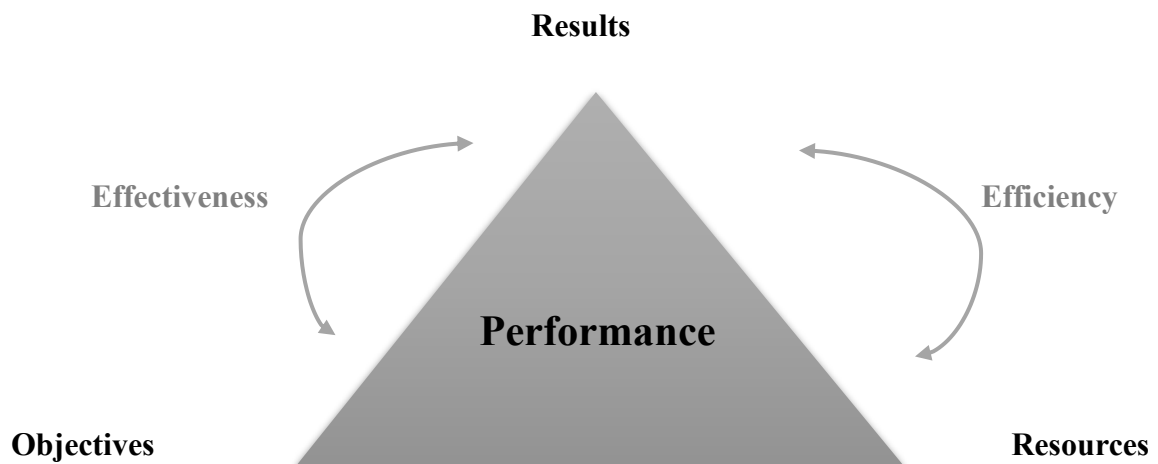
Chapter I: Information systems and Company's performance

In this exploration, we compile definitions from various esteemed authors:

- The concept of performance within a company refers to the degree of accomplishment of results considering the efforts applied and resources utilized. It predominantly relies on the concepts of effectiveness and efficiency. ¹
- A company's performance is determined by its capability to acquire and effectively utilize resources to gain a competitive advantage. ²
- Firm performance can serve as an indicator of the company's success in attaining its specified objectives. ³
- Performance involves evaluating the company's past and current condition and capabilities over time. ⁴

The figure illustrates the key components that contribute to overall performance within an organization.

Figure 3. Visual representation of performance in the form of a circle



Source : <https://pyx4.com/blog/performance-et-systemes-de-management-sont-ils-intimement-liesnoti>

¹ "Issor, Z». (2017). *Ibid.p(95/96)*.

² Iswatia, S., & Anshoria, M. (2007). *The influence of intellectual capital to financial performance at insurance companies in Jakarta Stock Exchange (JSE)*. In *Proceedings of the 13th Asia Pacific Management Conference*. Melbourne, Australia.

³ A, Moroz, Anastasya. (2023). *The Influence of Corporate Governance, Capital Structure, and Gender Diversity on Firm Performance*. *Journal of Management*. <https://doi.org/10.31959/jm.v12i1.1193>.

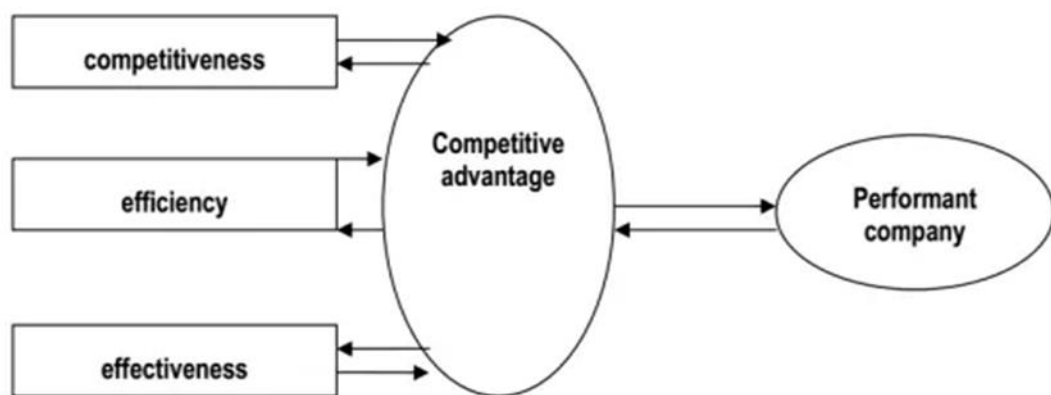
⁴ "Sukiantono Tang». (23 Aug 2022) *Liquidity, Leverage and Firm Performance with Firm Size as Moderating Variable*. *E-Jurnal Akuntansi*. <https://ojs.unud.ac.id/index.php/Akuntansi/index>.

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Verboncu and Zalman (2005) define performance as a result of management, economics, and marketing that reflects an organization's competitiveness, efficiency, and effectiveness, including its procedural and structural components. Performance might be considered similar as competitiveness.¹

The figure illustrates the key factors that drive performance as outlined by Verboncu & Zalman (2005).

Figure 4: Factors that drive performance (Verboncu&Zalman, 2005)



Source: IvyPanda. (2024, March 13). The Relevance of Financial Performance Measures and Targets. <https://ivypanda.com/essays/the-relevance-of-financial-performance-measures-and-targets/>

With the advancement of behavioral sciences, evaluation techniques, and new management systems, performance is continually developing and changing. Certain creation and performance evaluation philosophies have been eliminated during this process.

Alongside their dimensions, new performance evaluation scales and dimensions were concurrently introduced. As the organization's responsibilities and needs increased, these additional aspects had an impact on its operations and gained significance².

¹ Verboncu I, Zalman M.2005. "Management and performance", University Press,

² Wujiabudula, A. (2016). *The Relationship Between Emotional Intelligence, Organizational Learning, Management Innovation, Product Innovation and Firm Performance*. Published Dissertation: Yıldız University, Institute of Social Sciences, İstanbul.

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2. Types of Performance

Several types of performance provide information on different aspects of organizational functioning. We're going to examine some principal types of performance.

2.1 Operational performance¹

Operational performance is a key element of business operations that focuses on how efficiently and successfully a company executes its internal processes to reach its goals and objectives. It includes evaluating and enhancing key performance indicators (KPIs) including productivity, quality, consumer satisfaction, and cost effectiveness. By examining and improving its operational performance, a company can improve competitiveness, decrease costs, raise profitability, provide high-quality products or services to consumers, while retaining a competitive advantage in a highly competitive business environment.

2.2 Financial performance

Financial performance is a subjective evaluation of how successfully a company manages its financial resources and generates profits. It evaluates its financial status in terms of assets, liabilities, equity, costs, and revenues. ²

According to Sukawati and Wahidahwati (2020), financial performance is an effort made by all companies in controlling and evaluating every success gained through examining its financial information. On the other hand, Rudianto (2013: 189) defines financial performance as a result or achievement that the company's management has achieved by executing its task of efficiently managing company operations over a certain time period. ³

¹ "De Vera, D". (2024, January 22). *Operational Performance Explained: Definition, Importance, Example, and Challenges*. Accounting Professor.org. <https://accountingprofessor.org/operational-performance-explained-definition-importance-example-and-challenges/>. Accessed 19/03/2024 at 03:55AM

² *Financial Performance: Definition and Analysis* | StudySmarter. (n.d.). StudySmarter UK. <https://www.studysmarter.co.uk/explanations/business-studies/financial-performance/>. Accessed 18/03/2024 at 03:46AM

³ "Sukenti sukenti". (11 november 2022). *literature review of financial performance and financial distress: liquidity and profitability analysis (financial management literature review)*. *dinasti international journal of digital business management*, volume 3(issue 6), p. 994. <https://doi.org/10.31933/dijdbm.v3i6> .

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2.3 Economic performance

The term of economic performance in a company is multifaceted with many aspects influencing it. It refers to how a company operates, or how efficiently it achieves its objectives.¹

Thurik (1996) and Sofronov (2020)² both point out the value of efficiency and productivity in achieving economic performance.³

Kalyuzhnaya (2020) adds on this, highlighting the importance of financial stability and competitiveness as key indicators of economic performance.⁴ These examples illustrate the complexities of determining and evaluating the economic performance of a company.

2.4 Employee performance

Employee performance refers to how a member of staff performs their duties, completes essential tasks, and behaves in the workplace. Performance is measured in terms of work quality, quantity, and efficiency⁵. Performance is an important aspect in organizational success, as it helps increase overall productivity, profitability, and employee morale. Companies that execute frequently employee performance assessments may identify areas for improvement, give employee learning and development opportunities, and ensure that everyone is working toward the same goals.⁶

2.5 Environmental Performance⁷

The organization's impact on natural systems (ecosystems, air, and water) through inputs (raw materials, energy, water, etc.), outputs (products, services, pollution, waste), and investments in environmental protection.

¹ Succurro, M. (2016). *Economic Performance*. In *Encyclopedia of Law and Economics*. Springer, New York, NY. https://doi.org/10.1007/978-1-4614-7883-6_208-1

² "Sofronov, V., & Maksimova, S.M." (2020). *Enterprise performance and analysis of economic indicators. Normirovanie i oplata truda v promyshlennosti (Rationing and remuneration of labor in industry)*.

³ Thurik, A.R. (1996). *Introduction: Economic performance and small business*. *Small Business Economics*, 8, 327-328.

⁴ Kalyuzhnaya, E.S., Rogozhkina, V.Y., Dmitrieva, E.L., & Bykovskaya, E.V. (2020). *Financial Stability and Competitiveness as Indicators of Company Performance Efficacy*.

⁵ P. (2020, December 10). *Employee Performance: 9 Steps to Measure, Evaluate & Improve*. Perkbox. <https://www.perkbox.com/uk/resources/blog/employee-performance> . Accessed 27/03/2024 at 01:26AM

⁶ *What Is Employee Performance?* - Litmos. (2024, March 15). <https://www.litmos.com/platform/define-what-is-employee-performance> . . Accessed 27/03/2024 at 01:33AM

⁷ Monica-Violeta, A., Pinteá, M. O., & Sorin, B. (2011, January 1). *Social and Environmental Performance - New Dimension of Performance in the Context of Sustainable Development*. ResearchGate

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2.6 Social Performance¹

The impact of a company on the social system in which it functions. They are separated into four categories: work practices and conditions; on the other human rights; society; and product responsibility.

3. Objectives of Performance

Performance objectives help employees focus on achieving mission-related results. Performance objectives are different from work activities, task descriptions, and responsibilities outlined in a performance description.

- Work activity: refers to an employee's actions while executing their duties.
- A performance objective: defines the outcome of a work activity.

Examples:

Work activity: Installing software updates and patches on company computers and servers helps ensure system security and operation.

A performance objective: Reduce system vulnerabilities, by implementing software updates and patches within 24 hours of availability. Ensure 95% of company devices are always secure and up to date.²

The following are the most five common items that are included in a performance objective:

3.1 Quality³

Quality is a primary priority for the majority of companies. Providing high-quality products and services may significantly increase an organization's competitiveness. Providing high-quality products minimizes costs on rectification, waste, complaints, and returns, while also increasing customer satisfaction. According to some operations managers, quality is the most significant component influencing a company's performance in contrast to its competitors.

¹ Dos Santos M., (1992), "L'identification du systeme de gestion et son application a la recherche en gestion agricole". Universite de Montpellier I, doctoral thesis.

² Guide to Writing Effective Performance Objectives, Self Accomplishments and Evaluations. (2009). U.S. Department of Defense (.Gov).

³ Brandon-Jones, A., Slack, N., & Johnson, R. (2013). *Operations Management.P(564)*. (7th ed.) Pearson Prentice Hall

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3.2 Speed

Speed is the second most important performance objective. Speed is demonstrated by how quickly procedures are completed, consequently lowering lead times. Companies are focusing on faster decision-making by integrating Information and Communication Technologies (ICT) to provide important information. Companies improve their operations to increase efficiency and reduce time consumption. ¹

“Every 25% reduction in elapsed process time will double productivity and reduce costs by 20%” (George Stalk, "Competing Against Time"). ²

3.3 Dependability³

Dependability, the third performance objective it refers to the ability of companies to be relied on or trusted “trustworthy companies”. Dependability refers to a service's or system's ability to perform the needed tasks under specified conditions for a set amount of time. Dependability is extremely important for satisfying customer needs through accurate and efficient operations.

3.4 Flexibility⁴

According to Renner, Glauben, and Hockmann, a company's flexibility is its capacity to adapt to changing situations, particularly in terms of production, client orientation, technology, or organizational structure. Evans (1991) defined flexibility as a combination of "senses" such as adaptability, agility, corrigibility, elasticity, hedging, fluidity, malleability, plasticity, resilience, robustness, and variety and he argued that each of these flexibilities are a response to external risks or pressures.

¹ "Johan, Ekberg». "Johan, Karlsson». (2020). *Conversion of Performance Objectives into Operational Objectives in the nightclub industry: A dashboard design*. Department of Technology Management and Economics. CHALMERS UNIVERSITY OF TECHNOLOGY.

² Stalk, G., & Hout, T. M. (1990). *COMPETING AGAINST TIME*. *Research Technology Management*, 33(2), 19–24. <http://www.jstor.org/stable/24124815>

³ "Hitesh Bhasin". (June 20, 2023). *Dependability – Definition, Meaning, Elements, Examples and Benefits*. <https://www.marketing91.com/dependability/>. Accessed 01/04/2024 at 04:15AM

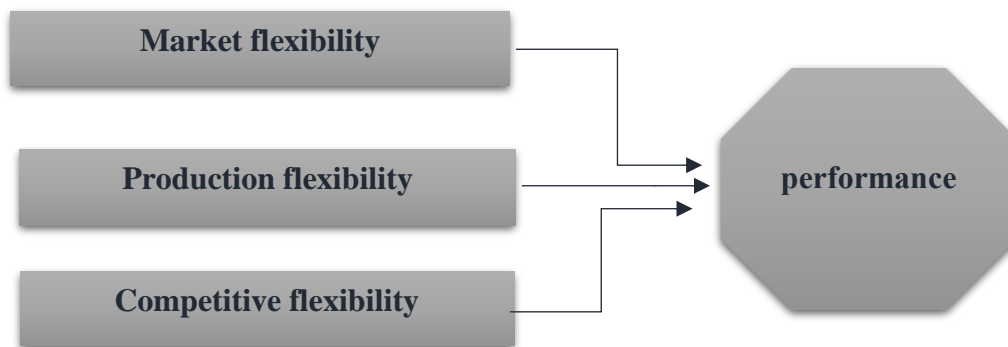
⁴ Evans, j.s. (1991), “strategic flexibility for high technology manoeuvres: a conceptual framework”, *journal of management studies*.

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In order to achieve significant organizational flexibility, a company must have three forms of flexibility: market flexibility, production flexibility, and competitive flexibility.

The figure shows three forms of flexibility, this is known formally as the "Flexibility Triad Model".¹

Figure 5: Flexibility Triad Model



Source: Created by us

3.5 Cost²

The last performance objective, cost, is defined as the monetary value spent by a company on providing services and maintaining the company's operations. Cost refers to the overall amount of money that a company must spend in order to keep operating.

4. Performance Measurement

This part offers definitions of performance measurements, dimensions, and indicators. The performance measurement is defined by Neely, as “the process of quantifying the efficiency and effectiveness of past actions”³. This procedure plays an essential role in determining the success or failure of a company's initiatives and strategies⁴.

¹ Yip G. (1989) *Global Strategy ... In a World of Nations*, Sloan Management Review, 31 (1), 29-41.

² Cost (Business): Definition, Meaning & Classification. (n.d.). StudySmarter UK. <https://www.studysmarter.co.uk/explanations/business-studies/nature-of-business/cost/#:~:text=Cost%20is%20defined%20as%20the,keep%20it%20up%20and%20running.>

³ Neely, A.D., Gregory, M., & Platts, K.W. (1995). *Performance measurement system design. A literature review and research agenda*. International Journal of Operations & Production Management, Vol. 15

⁴ Yuliani, F. (2012). *PERFORMANCE IMPROVEMENT PLANNING: EFFORTS TO DESIGN AND ACHIEVE PRIME PERFORMANCE*.

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Lebas, describes performance measurement as the process of transforming the complicated reality of performance into ordered symbols that can be linked and expressed under similar conditions¹. Simultaneously Sidrova and Isik underscore that performance measuring is a complex and important process in the same time.²

The objective of this measurement is to generate useful data for different problems and situations. This concept is further reinforced by Drucker, who famously stated that:

"What cannot be measured cannot be managed," providing a commonly used rationale for performance measurement.³

5. Performance Measurement Methods

5.1 Key Performance Indicators⁴

To evaluate performance, certain indicators or indices should be defined. Performance indicators are a method of performance measurement. Key performance indicators (KPIs) evaluate the performance of a solution or activity. They are often used to evaluate an organization's success by measuring performance towards a particular objective or goal and the difference between it and present status.

It is not a detailed and deeply analyzed information, but rather a broad overview of what is essential. It provides guidance for dealing with daily issues and enabling people to define their own priorities.

5.2 The Balanced Scorecard

To set up an effective performance measurement system, a company should incorporate both financial and non-financial indicators.

The balanced scorecard is one of the most extensively used measurement methods.

Kaplan and Norton created the concept in 1993 at Harvard. The authors pointed out the need to include both financial and non-financial measurements in the information system for

¹ Lebas, M. (1995). *Performance measurement and performance management*, *International Journal of Production Economics*, 23–35.

² Sidrova A., Isik O. (2010), *Business process research: a cross disciplinary review*, *Business Process Management Journal*, Vol 16 No. 4, pp. 566-597

³ Drucker, P. (1993), *The practice of Management*, NY: HarperCollins Publishers

⁴ Selmeçi, A., Orosz, I., Györök, G., & Orosz, T. (2012). *Key Performance Indicators used in ERP performance measurement applications*. 2012 IEEE 10th Jubilee International Symposium on Intelligent Systems and Informatics. doi:10.1109/sisy.2012.6339583

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employees across all levels of the company. Lower-level employees could figure out how their work affects the company's performance. However, managers would be informed about the exact factors that influence long-term financial performance. ¹

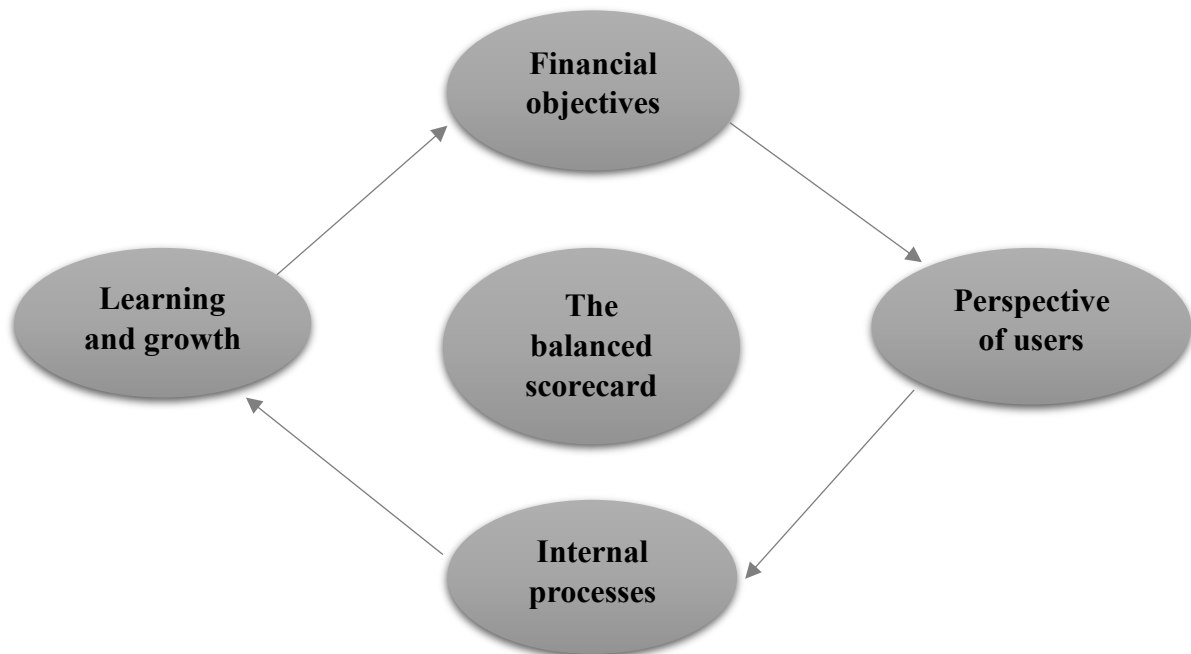
The Balanced Scorecard combines the organization's goal and strategy into a set of performance indicators that serve as a model for the performance measurement system: financial, customer, innovation and learning, and internal processes.

The balanced scorecard is based on four core perspectives: ²

- a) Financial objectives – How will we look like to our employees?
- b) 2. Perspective of users –How do we look like to our customers?
- c) 3. Internal processes – Which internal processes do we have to improve?
- d) 4. Learning and growth – How can the organization learn and improve?

The model below demonstrates the Company's performance through four perspectives:

Figure 6: The Four Perspectives of the Balanced Scorecard



Source: Created by us

¹ Kaplan, R.S. Norton, D.P. (2001). *Strategic scorecard. How to translate strategy into action*. Warsaw: PWN Scientific Publishing House.

² Balabonienė, I., & Večerskienė, G. (2015). *The Aspects of Performance Measurement in Public Sector Organization*. *Procedia - Social and Behavioral Sciences*, 213, 314–320. doi: 10.1016/j.sbspro.2015.11.544

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5.3 performance dashboards

Dashboards offer managers an overview view of their company's performance. As a concept, performance dashboards have been around for many years, and reports point out that they have been widely adopted by companies ¹. It can be defined as a visual display of the most important information needed for achieving one or more objectives, consolidated and arranged on a single screen so that the information can be monitored at a glance. ²A performance dashboard provides three types of functionalities, that I will discuss. Briefly, a performance dashboard allows company employees to:

- a) **Monitor:** Use metrics to monitor key company operations and activities, and set up alerts when performance falls below of specified objectives.
- b) **Analyze:** Analyze the fundamental cause of issues by collecting timely and pertinent data from a variety of sources and at several levels of detail.
- c) **Manage:** Manage people and processes to improve decision-making, maximize performance, and lead the company in the proper path. ³

6. The contribution of Integrating Information Systems to the improvement of the Company's performance

The importance of Information Systems (IS) for companies has grown over time. Information Systems (IS) investments are recognized for their ability to improve Company's performance by saving money, gaining its competitive advantage, and improving overall performance, resulting in higher profits. However, these benefits increase companies' dependency on IS for daily operations, requesting more investment in such technologies (Gómez & Suárez, 2012; Petter, DeLone, & McLean, 2008).⁴

A company's information system integrates people and material resources devoted to processing company data⁵. This integration improves operations, administration, and information

¹ Yigitbasioglu, O. M., & Velcu-Laitinen, O. (2012). *The Use of Dashboards in Performance Management: Evidence from Sales Managers. The International Journal of Digital Accounting Research*, 12, 36–58. https://doi.org/10.4192/1577-8517-v12_2

² Few, S. (2006) "Information Dashboard Design, The Effective Visual Communication of Data", O'Reilly Media, Inc, First Edition 2006

³ *What Are Performance Dashboards. (2015). Performance Dashboards*, 3–22. doi:10.1002/9781119199984.ch

⁴ Bakos, Y. y Treacy, M. (1986). *Information technology and corporate strategy: A research perspective. MIS Quarterly*, 10, 107-119. <http://dx.doi.org/10.2307/249029>

⁵ Medina, J. (2005). *Evaluación del impacto de los sistemas de información en el desempeño individual del usuario: aplicación en instituciones universitarias. Universidad Politécnica de Madrid. Tesis inédita.*

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management, thus boosting productivity and competitiveness. the ISs frequently exist within every department to assist and improve efficiency and operational efficacy¹. Ravichandran & Lertwongsatien have examined this relationship using the concept of resources and capabilities, implying that a company's performance is linked to how efficiently it uses the computer system². The capacity to produce high-quality items and services and on timetable is essential for addressing company needs more effectively than other facilities (Saeidi et al., 2015)³. This efficiency is important for the achievement of lcompanies, which rely on timely and reliable data in order to carry out their operations effectively. An efficient information system (IS) is today a must for survival, not only to make improvements in performance (Karim, 2011)⁴.

A multitude of companies are increasingly depending on ISs, which require a wide variety of skills to properly support and perform the company's objectives. An IS combines information, people, systems, databases, and devices to generate daily data that helps managers make effective and profitable decisions. An IS helps in ensuring that real Performance matches with the organization's planned performance standards, consequently assisting with effective decision-making and achieving organizational goals.

Conclusion

In conclusion, the contribution of an Integrated Information Systems (IIS) to Company's performance is substantial and multifaceted. IIS improves operational efficiency by streamlining processes and automating routine tasks, which leads to optimal resource utilization and allows employees to focus on strategic initiatives. It significantly improves decision-making by providing real-time, accurate data, enabling timely and well-informed choices. Furthermore, IIS fosters better communication and collaboration through a unified platform and integrated tools, ensuring cohesive teamwork and coordination.

The system's capability to generate comprehensive reports and maintain regulatory compliance aids in detailed performance tracking and strategic planning. Its scalability and adaptability

¹ Haag, S. y Cummings, M. (2013). *Management information systems for the information age (9th ed.)*. USA: McGrawHill Education.

² Ravichandran, T. y Lertwongsatien, C. (2005). *Effect of information systems resources and capabilities on firm performance: A resource-based perspective*. *Journal of Management Information Systems*, 21, 237-276.

³ S. P. Saeidi, S. Sofian, P. Saeidi, S. P. Saeidi, and S. A. Saeidi, "How does corporate social responsibility contribute to firm financial performance? The mediating role of competitive advantage, reputation, and customer satisfaction," *J. Bus. Res.*, vol. 68, no. 2, pp. 341-350, 2015

⁴ J. Karim, "The Significance of Management Information Systems for Enhancing Strategic and Tactical Planning," *J. Inf. Syst. Technol. Manag.*, vol. 8, no. 2, pp. 459-470, 2011.

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ensure long-term relevance and support organizational growth. Moreover, IIS reduces operational and IT costs by eliminating redundancies and consolidating disparate systems. Case studies from various industries, such as manufacturing, healthcare, and retail, illustrate the tangible benefits of IIS, highlighting its useful role in achieving significant improvements in efficiency, cost savings, and customer satisfaction. Therefore, implementing an IIS is a strategic imperative for companies aiming to contribute their performance and maintain a competitive edge.

**CHAPTER II: THE CONTRIBUTION OF INTEGRATING
INFORMATION SYSTEMs TO THE IMPROVEMENT OF THE
COMPANY'S PERFORMANCE – Case Study EPAL**

Chapter II: The contribution of Integrating Information Systems to the improvement of the Company's performance.

Chapter II: The contribution of Integrating Information Systems to the improvement of the Company's performance– Case Study EPAL.

As part of the graduation project preparation, an internship was carried out at the Algiers port company's planning and IT department. This practical section concluded in order to put into practice all of our theoretical data on IS and the performance of the company covered in the previous chapter.

The first section of this chapter titled "The contribution of Integrating Information Systems to the improvement of the Company's performance" will introduce the company of internship and its history, operations, and directions, then we are going to present an overview of the methods employed in our survey. Lastly, the second section we proceed to the study's results and recommendations.

Section 01: Company Presentation and Survey methodology

1. Presentation of EPAL

The Port of Algiers, located on the southern coast of the Mediterranean Sea, gained autonomy in 1989 and operates as a joint-stock company (SPA). Since 1999, it has been managed by a state-owned economic enterprise.

EPAL manages the port's infrastructure, including docks, warehouses, and specialized facilities like container terminals and grain gantries. Additionally, it oversees commercial operations related to ship and cargo handling.

EPAL plays a crucial role in promoting foreign trade by ensuring smooth transit for people and goods. It acts as both a port authority and a commercial entity, striving to facilitate international exchanges. Below, you'll find a geographical map and a fact sheet providing further details about EPAL.

The General direction of the Port of Algiers is structured around the Deputy Managing Director, who exercises direct hierarchical authority over all the structures of the E.P.A.L (Algiers Port Company) at all levels. The organization of the E.P.A.L is built around it.

Chapter II: The contribution of Integrating Information Systems to the improvement of the Company's performance.

The organization of EPAL comprises fourteen central departments, distributed as follows:

1.1 Operational Directions

- Harbor Master's Office (H.M.O).
- Stevedoring Department (S.D).
- Handling Department (H.D).
- Container Terminal Department (C.T.D).
- Central Logistics Department (C.L.D).
- Towing Department (T. D).

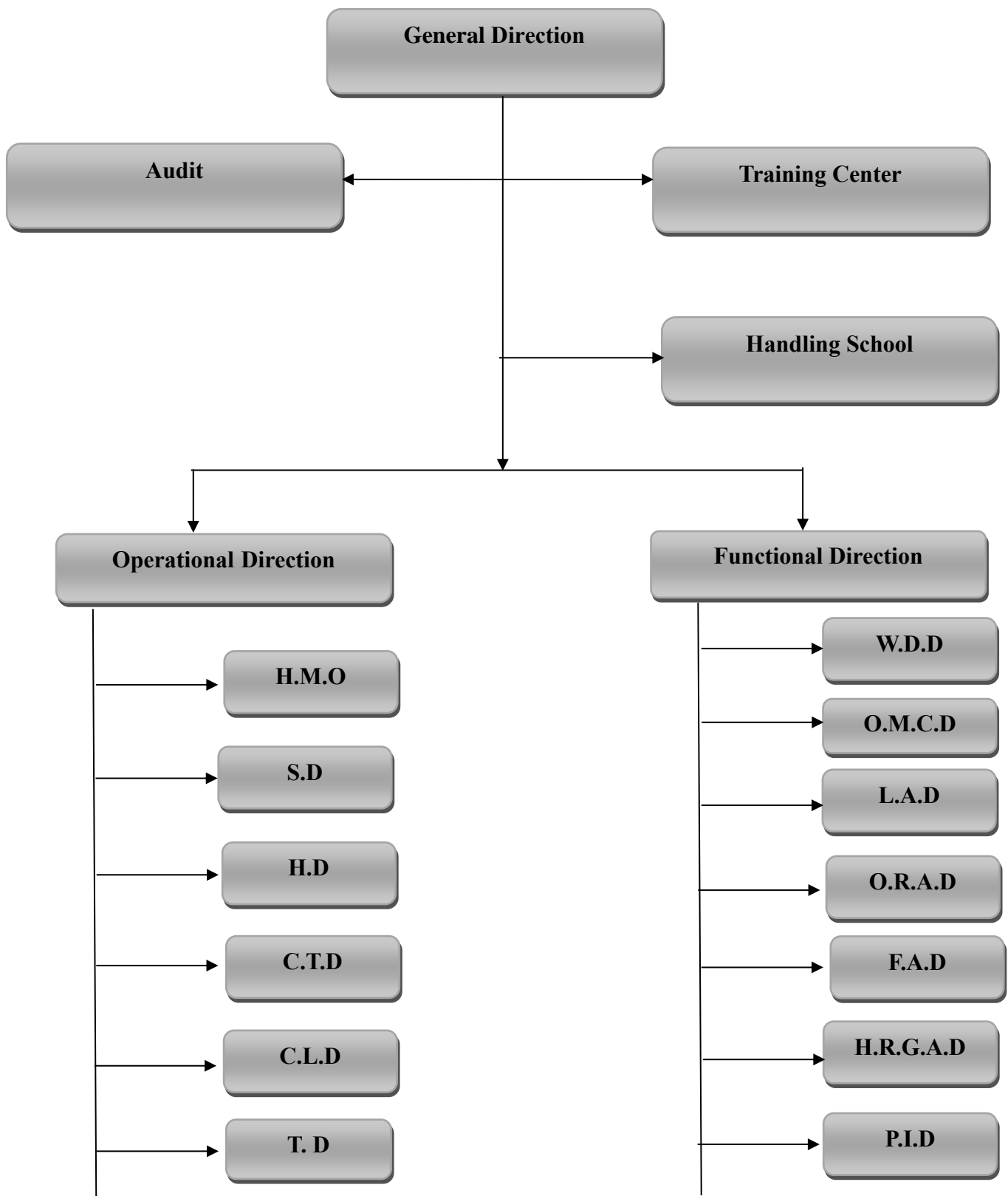
1.2 Functional Directions

- Works and Development Department (W.D.D).
- Organization and Management Control Department (O.M.C.D).
- Legal Affairs Department (L.A.D).
- Operations and Regulatory Affairs Department (O.R.A.D).
- Finance and Accounting Department (F.A.D).
- Human Resources and General Affairs Department (H.R.G.A.D).
- Planning and Information Technology Department (P.I.D).
- Enterprise Internal Security Department (E.I.S.D).

The figure titled "EPAL's Structures and Organizational Chart" presents the hierarchical structure of the EPAL organization.

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Figure 7: EPAL's structures and organizational chart



Source: Internal company document.

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2. Presentation of Internship Department

The Planning & IT Directorate is responsible for the development, maintenance, and security of the company's information system. It is organized to provide services to users.

2.1 Missions

- Change the IT Department's culture and promote organizational change, all while improving comprehension between management and technology.
- Train the staff of the IT Department (DPI) and internal users.
- Develop and implement the company's IT master plan and align the information system and DPI services with the company's strategic objectives.
- Implement an information system that is both flexible and stable, ensuring its evolution, security, and sustainability.
- Effectively pilots the IT Department's activities utilizing performance metrics and targets, while maintaining operational continuity.
- Enhance service levels and user satisfaction.
- Generate budget estimations for the department.
- Initiate, approve, and manage complicated projects while maintaining technological supervision.
- Procure computer equipment and consumable products.

Here are the main missions and responsibilities of each department as shown below:

2.1.1 The Systems and Support Department are responsible for:

- System Administration & Messaging.
- Backup and restoration of system and data for the IT platform.
- Database Administration.
- Maintenance of IT equipment.
- Updating the inventory of IT equipment and tracking the IT fleet.
- Ensuring the security of systems and databases.
- User access management to systems.

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2.1.2 The Department of IT research and Development are responsible for:

- Managing user needs.
- Analysis and development of software that suits the demands of the company's structures.
- Analysis and develop schemas for databases that satisfy the demands of that company.
- Ensure the design of an integrated information system, as well as relevant and appropriate coding.
- Ensuring the design of products (software and database schemas) that guarantee data consistency, integrity, and reliability.
- Achieving secure development to ensure a reliable information system.
- Secure administration and management of the web.
- Management web access.
- Updating technical manuals of products designed and developed, particularly database schemas and specification dictionaries.

2.1.3 The IT Operations Department are responsible for:

- Supervising the operation of paying employees within the company.
- Supervising the performance of software products that impact functional and administrative company areas.
- Supervising the functioning of software products relevant to operational company sectors.
- Implementing software products.
- Training users concerning the way to utilize the software that has been implemented.
- Examining databases and pulling data from different divisions of the company.
- Managing the security, integrity, consistency, and reliability of operational data.
- Managing user access to databases through company applications.
- Updating technical manuals and operational documents.
- Updating operational procedures and processes.

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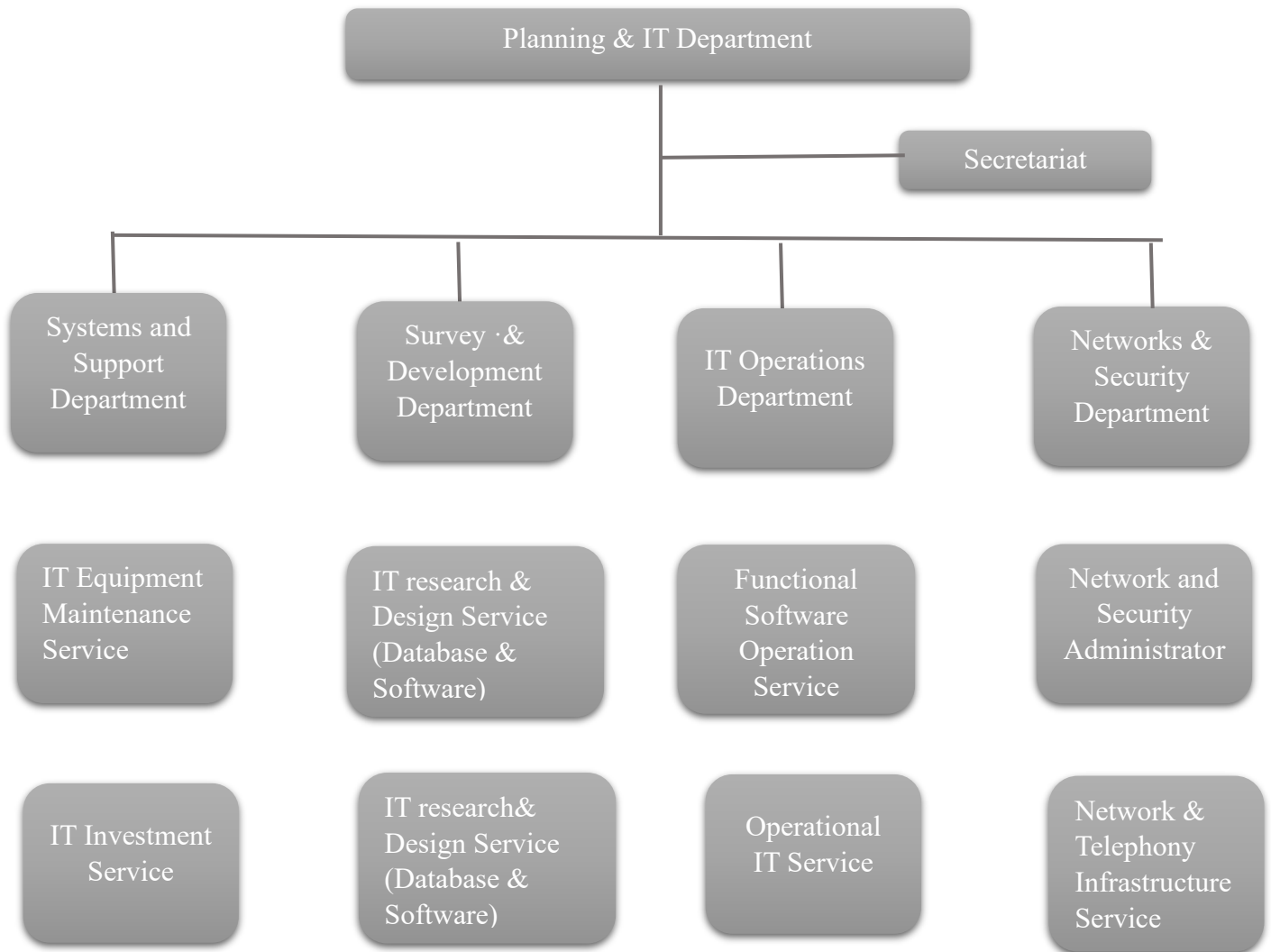
2.1.4 The Network and Security Department are accountable for:

- Responsible for network management.
- Managed network access and domain connections.
- Supervision and security surveillance of the network perimeter.
- Managing Unified Threat Management (UTM) and Intrusion Prevention Systems (IPS).
- Managing antivirus software.
- Monitor and maintain network and telephone infrastructure.
- Maintaining configuration documents, schematics, operating procedures, and protocols.

The following is a representation of the company's structure represented schematically the various departments. Each department plays a crucial role in ensuring the smooth operation and success of our company.

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Figure 8: The Planning & IT department 's structures



Source: Internal company document

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3. Survey on the contribution of integrating information systems to the improvement of the EPAL'S performance

In this part, we outline the methodology chosen to investigate our research question: "How can information systems integration contribute to improving Company's performance?" This approach is conducted objectively in order to reach appropriate conclusions.

3.1 Survey methodology

A research methodology is a procedure selected by a researcher to empirically address research questions. This process encompasses a series of steps that researchers rely on to operationalize the scientific process. The choice of survey method depends on the research question and the objectives of the survey.

Therefore, for both qualitative and quantitative studies (interview, questionnaire), an investigator must follow a methodological approach, which is based on:

- The definition of the survey objective.
- The study plans.
- The presentation of results.

3.2 The objective of the study

Our research focuses on analyzing the improvements brought by the integration of a Document Management System (DMS) named EPAL.GED and its contribution to the continuous development of the EPAL company's performance.

3.3 Methodological Approachs

In order to analyze the contribution of integrating information system to the improvement of the EPAL company's performance, we opted two types of studies. First, a qualitative study using structured interview involving several employees that are primarily using the document management system EPAL.GED of the company, followed by a quantitative study in which we used a questionnaire. Our objective was to collect the key information for our problematic statement and then verify our hypothesis.

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3.3.1 Presentation of the qualitative study

We conducted a qualitative study using interview to gather information and provide an answer for our problematic. This part describes the study's research methodology.

3.3.1.1 Interview

Qualitative surveys may be conducted employing several interview approaches. Before we look at these methods, we'll first define the interview. according to Kvale “the interview is a construction site for knowledge. An interview is literally an inter-view, an inter-change of views between two persons conversing about a theme of mutual interest” (Kvale, 1996, p. 14)¹.

3.3.1.2 The different types of interviews

There are three types of interviews: unstructured, semi-structured, and structured.

a) An unstructured interview

An unstructured interview is a free-flowing discussion between a researcher and a participant. The interviewer has a general research question that drives their interest in conducting the interview, but the interview questions are not planned. ²

b) A semi-structured interview

A semi-structured interview is a data collection strategy in which participants are asked a series of open-ended questions and then followed up with probing questions in order to gather further information about their response and the topic of interest. ³

c) A Structured interview

A structured interview is when an interviewer asks the same predefined list of questions to all job candidates. Having questions fully planned out in advance could help professionals feel prepared as they join into an interview, as well as making the interview process easier. ⁴

¹ Kvale, S. (1996) *InterViews: An introduction to qualitative research interviewing*. London: SAGE Publications.

² Sybing, R. (2024, April 8). *Unstructured Interviews: When and How to Use Them*. ATLAS.ti. <https://atlasti.com/research-hub/>, Accessed 18/05/2024 at 03:15AM

³ Delve, Ho, L., & Limpaecher, A. (2022, April 6). *Semi Structured Interviews* <https://delvetool.com/blog/semi-structured>, Accessed 18/05/2024 at 03:20AM

⁴ Xu, T. (2023, February 21). *What Is a Structured Interview? Definition and Examples*. Built In., <https://builtin.com/recruiting/structured-interviews>, Accessed 18/05/2024 at 03:22AM

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3.3.2 Presentation of the quantitative study

3.3.2.1 The questionnaire

A questionnaire is a collection of questions or objects designed to gather data from respondents about their attitudes, experiences, or opinions. Questionnaires can be used to obtain quantitative and qualitative data.

Questionnaires are frequently used in market research, as well as the social and medical sciences. For example, a company could ask for feedback on a recent customer service experience, while psychologists may use surveys to study health risk perceptions. ¹

When it comes to the benefits of questionnaires in research, the list of advantages is extensive, such as:

- Cost savings.
- Reach people quickly.
- Large-scale data collection ².

3.3.2.2 Types of questions in questionnaire

The questionnaire can include multiple types of questions:

a) Open-ended questions

Open-ended questions allow responders to answer using their own words.

b) Closed-ended questions

Closed-ended questions ask respondents to select one-word answers like "yes/no" or "true/false".

¹ Bhandari, P. (2023, June 22). Questionnaire Design | Methods, Question Types & Examples. Scribbr. Retrieved May 14, 2024, from <https://www.scribbr.com/methodology/questionnaire/>

² Nigel Lindemann ,June 7, 2023, 12 advantages and disadvantages of questionnaires , <https://pointerpro.com/blog/questionnaire-pros-and-cons/> Accessed 15/05/2024 at 02:15AM

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c) Multiple choice questions

Multiple choice questions allow respondents to select multiple options.

d) Likert scale questions

A Likert scale is frequently used as a simple easy rating tool.

Section 02: Analysing the results of the survey

After presenting a global overview of the EPAL company and our research methods, we will demonstrate our results in order to either confirm or deny hypotheses.

1. Analysing the results of the qualitative study

We conducted an interview with two department heads and one developer within the EPAL company. During this interview, we asked a multitude of questions (see appendix 01). Our analysis of the answers collected is as follows:

1.1 Presentation of the interview guide

The questions below relate to the information we collected through direct interviews with three members of the planning and IT department.

1.2 Objective of the interview

The interview aims to acquire perspective and ideas on how information systems such EPAL.GED improve the company's performance.

1.3 Interview results

- **Interview with The Developer of EPAL.GED system**

Q1: What is your position in the company and what are your responsibilities?

"I hold the title of Development Engineer and currently, I am responsible for the design, maintenance, upkeep, and deployment of the EPAL.GED system."

Q2: What information systems have you integrated?

"E-PAL.GED", EPAL is the name of our company which refers to the Port Corporation of Algeria. The term "GED" refers to "Gestion Électronique des Documents" (Electronic Document Management) and it describes the concept behind our solution. It is an adaptable

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system made to meet the needs of our company, which is designed to manage, distribute, and facilitate information sharing and document access. “

Q3: When was this integration implemented?

“In 2021, we also developed new version this year.”

Q4: What were the problems and needs before the integration of EPAL.GED system?

“The company faced challenges with accessing to specific documents, led to delays, inefficiencies, and potential errors. Additionally, there are issues with the procedure for responding to letters and information delivered by various departments. These challenges prompted the company to integrate a Document Management System (DMS).”

Q5: What goals were pursued?

“Actually, we wanted to reduce the volume of paper used as much as possible, also to facilitate information and documents transfers. we wanted also to protect information, employees cannot distribute informations or documents to any individual, they must go via the individual who is responsible in order to respect hierarchy, which make the process of sharing information more secure.”

Q6: What are the functions of EPAL.GED system?

“There are multiple functionalities. There's investigating, transmission, storage of information and documents, creating letters, make and share decision immediately, either administrative or operational. It might be an admissions order, it might be a personal or a commercial contract, it might be a transcript also instructions for other departments.”

Q7: Have you observed any reduction in lead times or cost savings as a result of this integration?

“Following the integration of the DMS, the company has experienced cost reductions in paper usage, Moreover, deadlines and transferring documents due to the easy accessibility and organization of information. This underlines the primary objective of digitization.”

Q8: How has the integration of the DMS contributed to collaboration, communication, and productivity within the company?

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“The integration has considerably improved collaboration as well as communication among many departments compared to previously, EPAL.GED facilitate clearer communication, ensuring that everyone involved understands their roles and responsibilities, which minimizes errors and misunderstandings. This increased efficiency translates directly into improved productivity across teams and departments. “

Q9: Has the integration of the EPAL.GED system improved the efficiency of work processes within your department and between teams?

“Overall, there has been an improvement in the effectiveness of the decision- implementation process. As an example, if the "E-PAL.GED" system is unavailable, the responsible person must create, for example, 10 copies of a document pertaining to an important decision and distribute them personally. This approach significantly consumes resources and staff time, leading to inefficiencies and delay decision implementation process.”

Q10: Do you use indicators to monitor the performance of the EPAL.GED system? If yes, which ones?

“No, we do not rely on indicators for evaluating system performance; instead, we focus on ongoing maintenance and development to address issues and improve functionality.”

• Interview with the Head of the of Research and Development Department

Q1: What is your position in the company and what are your responsibilities?

“Head of the of Research and Development Department, Responsible for all aspects of application development, software acquisition, and the reliability of internal development. There is a lot of responsibility involved, Furthermore, I am in charge of managing the department's staff.”

Q2: What information system have you integrated?

“EPAL.GED It's a system that manage documents and provide immidiate communications.”

Q3: When was this integration implemented?

“In 2021”.

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Q4: What were the problems and needs before the integration of EPAL.GED system?

*“Certain departments faced difficulty managing contracts, bills, and purchase orders, which need an extended process from ordering to delivery and reception. This technique employs a lot of printing equipment and paper and causes delays, especially when investigating documents.
“*

Q5: What goals were pursued?

“The objective is to:

•Reduce costs and improve the ability to easily find documents and avoid the manipulation of original documents, ensuring they cannot be deteriorated.”

Q6: What are the functions of EPAL.GED system?

“Allows immediate interaction with all parties involved. Classify documents, guarantees that everyone can access documents and mail, respond, offer information, and take appropriate action as needed. It is an important communication tool for avoiding misconceptions. “

Q7: Have you observed any reduction in lead times or cost savings as a result of this integration?

“Yes, there is a significant reduction in the time needed to process or transmit documents and decisions. We also have noticeable reductions in paper usage.”

Q8: How has the integration of the DMS contributed to collaboration, communication, and productivity within the company?

“Compared to before the integration of the DMS Increased efficiency in accessing and sharing documents and information which can lead to faster decision- implementation and task completion, ultimately improving overall Company's performance. It has also a psychological impact, as everyone has access to information.”

Q9: Has the integration of the EPAL.GED system improved the efficiency of work processes within your department and between teams?

“It is extremely helpful in decision- implementation processes. For example, decisions given by the CEO through staff members aren't executed out mindlessly. We can't proceed without proof

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of specific instructions. This impacts the responsibilities of the team and individuals, it protects everyone."

Q10: Do you use indicators to monitor the performance of the EPAL.GED system? If yes, which ones?

"No, we only use technical indicators to evaluate the performance of software developments."

• Interview with The Head of the Research and Design Department

Q1: What is your position in the company and what are your responsibilities?

"I am the Head of the Research and Design Department and developer, I'm in charge of research, design, development, application installation, and customer service."

Q2: What information system have you integrated?

"The EPAL.ged document management system. We developed this system to automate and improve document management because the company has previously managed papers manually. The system provides an opportunity for efficient consultation of documents."

Q3 When was this integration implemented?

"In 2021."

Q4: What were the problems and needs before the integration of EPAL.GED system?

"They faced difficulties to find and share documents and costs problem due to the necessity for multiple copies of the document The EPAL.GED system eliminates the need for additional copies because the document is already available within the system. This enables staff to access documents whenever they need them."

Q5: What goals were pursued?

"The objective is to:

- Reducing costs.*
- Advantages of using real-time information.*
- improved job efficiency and time reductions.*
- Digital transformation, storing, and archiving information provides its transparency."*

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Q6: What are the functions of EPAL.GED system?

- *“Managing documents.*
- Communication between departments*
- Storing informations “*

Q7: Have you observed any reduction in lead times or cost savings as a result of this implementation?

“We've actually reduced paper usage, which has automatically reduced costs and time delays “

Q8: How has the integration of the DMS contributed to collaboration, communication, and productivity within the organization?

“It's about information sharing, collaboration between departments has become easier and more efficient. Employees can easily access and share information and documents across different teams, leading to improved communication and collaboration on projects and tasks. This improved collaboration has not only facilitated workflows but has also fostered a sense of unity and teamwork among employees.”

Q9: Has the integration of the EPAL.GED system improved the efficiency of work processes within your department and between teams?

“Yes, of course, it has improved.”

Q10: Do you use indicators to monitor the performance of the EPAL.GED system? If yes, which ones?

“If our needs are automatically satisfied, we have no problems to address, so we don't measure performance. We simply focus on maintenance and development.”

1.4 Results analysis

The roles and responsibilities of the interviewees show a comprehensive involvement in both the technical and managerial aspects of the EPAL.GED system. The combination of development, maintenance, strategic planning, and direct customer service indicates a multi-faceted approach to system management and integration.

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According to all interviews, EPAL.GED provides a key functionality of managing documents and communications. This consistency reinforces the system's role in streamlining document management and facilitating information sharing across the organization.

The integration year (2021) is consistent across responses, The development of a new version suggests ongoing improvements and adaptability of the system to meet evolving needs.

Common problems included document access difficulties, inefficiencies, and high costs due to paper usage. The need for better management of communications and contracts is also an annual matter. These issues underscore the necessity for a more efficient and cost-effective document management system.

Key goals include cost reduction, improved efficiency and accessibility, and secure information processing. The focus on reducing paper usage and improving digital processes aligns with modern objectives.

The system's functions cover document management, communication, and immediate interaction capabilities. These functionalities aim to streamline workflows, ensure timely responses and improve overall organizational efficiency.

The implementation of the EPAL.GED system has led to notable reductions in lead times and cost savings within the company. By digitizing documents and facilitating easy access and organization, the system has minimized the reliance on paper, resulting in significant cost savings, which optimize operational efficiency.

The integration of EPAL.GED has significantly improved collaboration, communication, and productivity across the company. By streamlining information access and sharing, the system has fostered better teamwork, reduced errors, and increased overall efficiency.

The integration of the EPAL.GED system has substantially increased the efficiency of work processes both within individual departments and across teams. The system has enhanced decision-making by ensuring clear documentation and communication of decisions, which leads to more effective and efficient implementation. Additionally, the system ensures accountability and reduces errors by providing documented proof of instructions, which impacts team responsibilities and individual accountability.

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There is a general lack of formal performance indicators for the system, with a focus on ongoing maintenance and development. This suggests an area for potential improvement, as implementing performance metrics could help further optimize system efficiency and effectiveness.

In conclusion, the integration of the EPAL.GED system within the Port Corporation of Algeria represents an important advancement towards digital transformation and operational efficiency. Through the interviews answers we point out that the system has effectively addressed frequently challenges related to document management, communication, and collaboration by simplifying procedures, reducing paper usage, and improving access to information. The EPAL.GED system have played an extremely important role in optimizing work processes and decision-making across departments. Overall, the integration of EPAL.GED has not only modernized document management practices but also fostered a culture of collaboration and innovation within the company, positioning it for long-term development and achievement in the information technology era.

2. Analysing the results of the quantitative study

We will analyze the questionnaire data carefully, examining each response separately. We will be able to identify and extract the determinant variables needed for further analysis using this method.

2.1 Survey population

The population of our survey consists of 30 employees in headquarter of EPAL, located at 04 rue Djawaharlal Nehru, Alger Centre Bp:259 Alger, Algeria, in the Planning & IT department. We were able to select a sample of 20 individuals who responded to our questionnaire.

2.2 Construction of the questionnaire

To formulate this questionnaire, we first identified the survey goals as indicated in the subject paragraph. Our questionnaire consists of fourteen questions.

2.3 Types of questions

- We included Closed questions.
- Linear scales in the form to keep respondents focused and involved.

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- We also employed check boxes, allowing readers to pick several propositions for a single question.
- An open question is one for which no predetermined responses are presented to the respondent, giving them entire freedom in replying.

2.4 The structure of the questionnaire

In order to acquire respondents' trust, we introduced the subject and the objective of our study.

Each part includes questions to collect pertinent data from respondents for our research purposes.

2.5 Data Collection and Analysis

In collection phase, we created our online questionnaire using Google Forms.

To process the questionnaire results, we chose to use the software SPSS (Statistical Package for the Social Sciences), which is a software package used by researchers in different fields for quantitative analysis of complicated data, analyze and better understand data, and solve complex business and research problems.

2.6 Processing the questionnaire

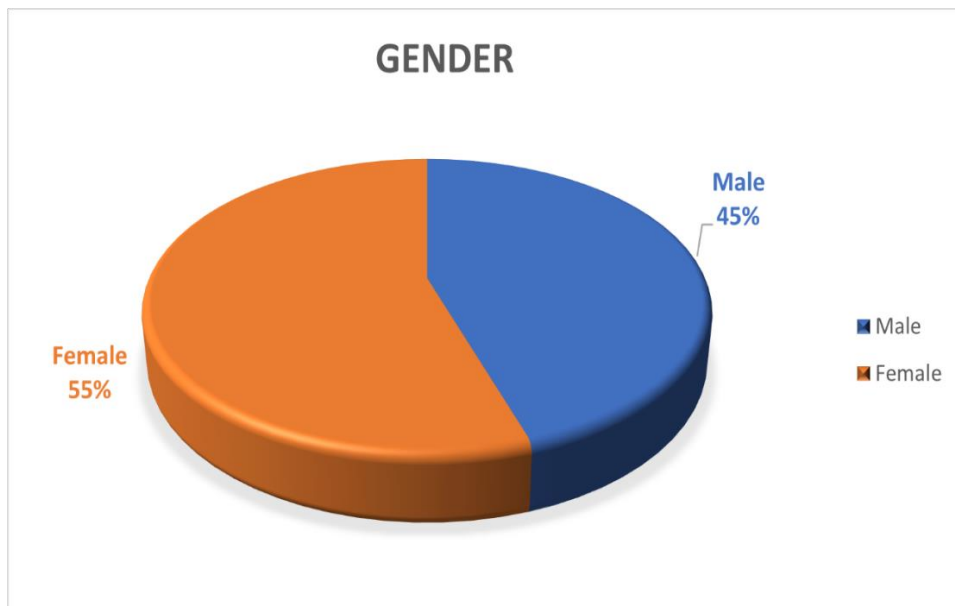
The informations are analyzed after the fieldwork is completed and all questionnaire responses have been gathered.

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A. Q1: Select your gender

This graph presents the distribution of gender among the survey respondents:

Graph 1 : Gender distribution



Source: Made by us on the basis of the results of the questionnaire” using Ms Excel”

Comments:

We found that out of a total of 20 respondents, 9 are male and 11 are female. This indicates that males constitute 45% of the respondents, while females make up 55%. The data suggests a slightly higher representation of females compared to males within this sample.

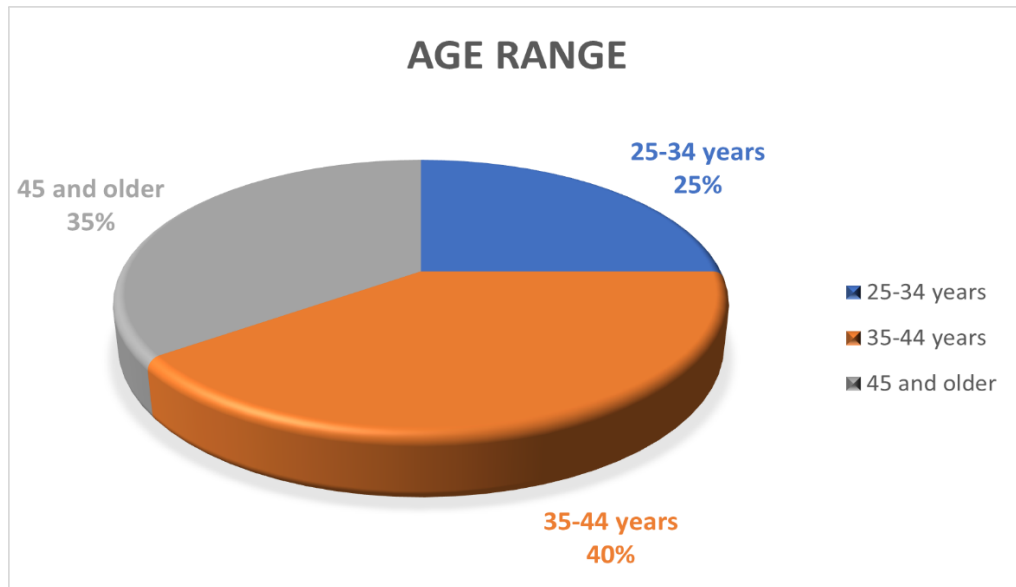
This gender distribution reflects that there are slightly more female employees than male employees within the company. This higher representation of females among the respondents is likely due to the actual gender composition of the company's workforce, where females constitute a majority.

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B.Q2: Age range

This graph illustrates the age range of the participants involved in the study:

Graph 2: Age range



Source: Made by us on the basis of the results of the questionnaire” using Ms Excel”

Comments:

The pie chart provides an age range analysis of respondents, indicating the distribution of participants across different age groups.

- The largest group of respondents falls within the 35-44 years age range, making up 40% of the total respondents.
- The next largest group is 45 and older, comprising 35% of the respondents.
- The smallest group is the 25-34 years age range, accounting for 25% of the respondents.

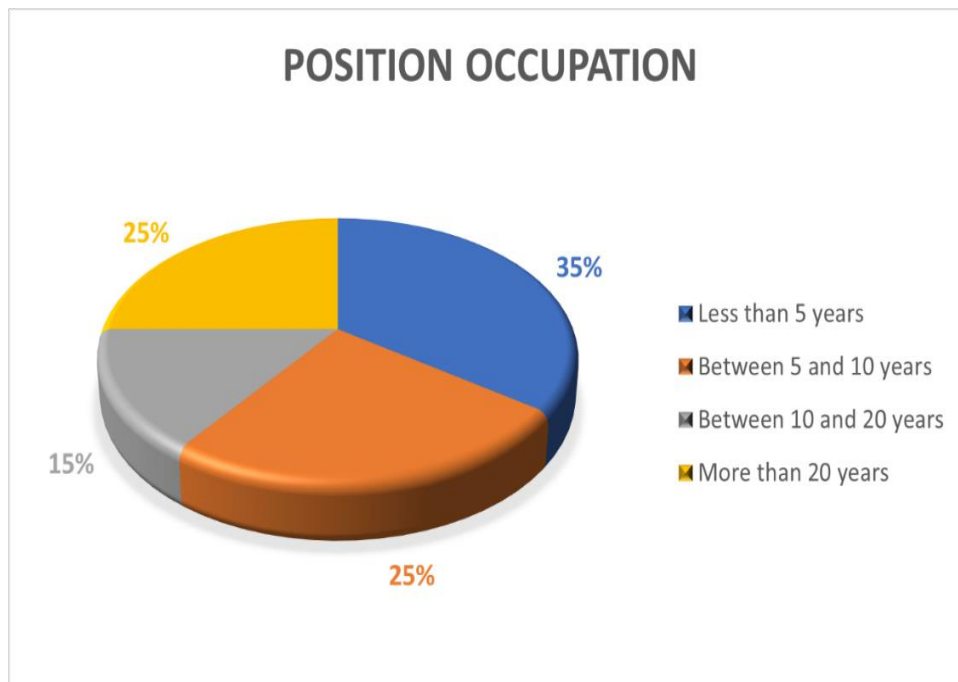
The age range distribution is well-balanced, with a slight predominance of mid-career and senior employees, it highlights that the majority of respondents are likely to have significant work experience, which can provide a deeper insight into the contribution of a EPAL.GED DMS to the Company's performance.

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C.Q3: How long have you been in your current position at EPAL?

This graph displays the different occupations of the respondents:

Graph 3: Occupation



Source: Made by us on the basis of the results of the questionnaire” using Ms Excel”

Comments:

We found that 35.0% of respondents have been in their position for less than 5 years.

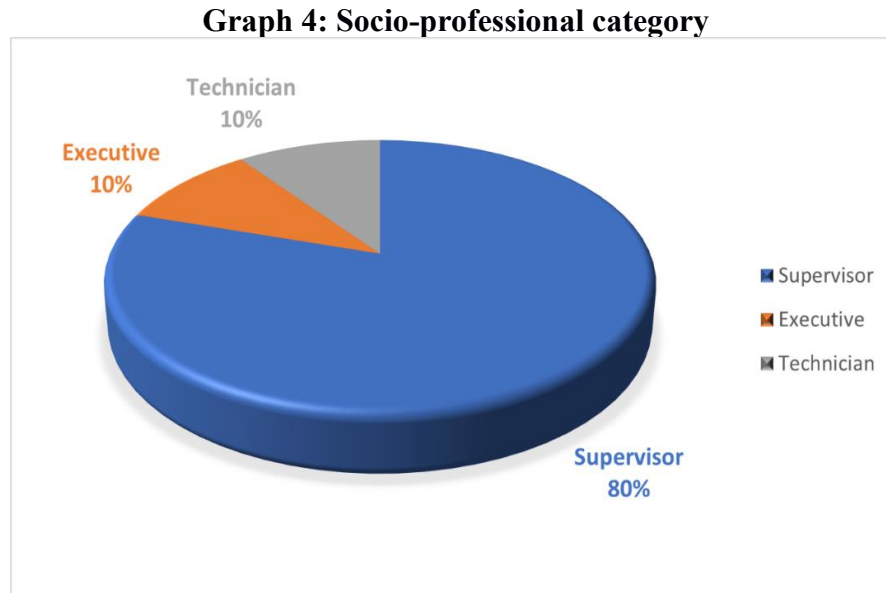
The second-largest groups are those with an experience between 5 and 10 years and those with more than 20 years, each constituting 25.0% of the respondents.

Then employees with an experience between 10 and 20 years, comprising 15.0% of the respondents.

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D.Q4: Socio-professional category

This graph shows the socio-professional categories of the survey participants:



Source: Made by us on the basis of the results of the questionnaire” using Ms Excel”

Comments:

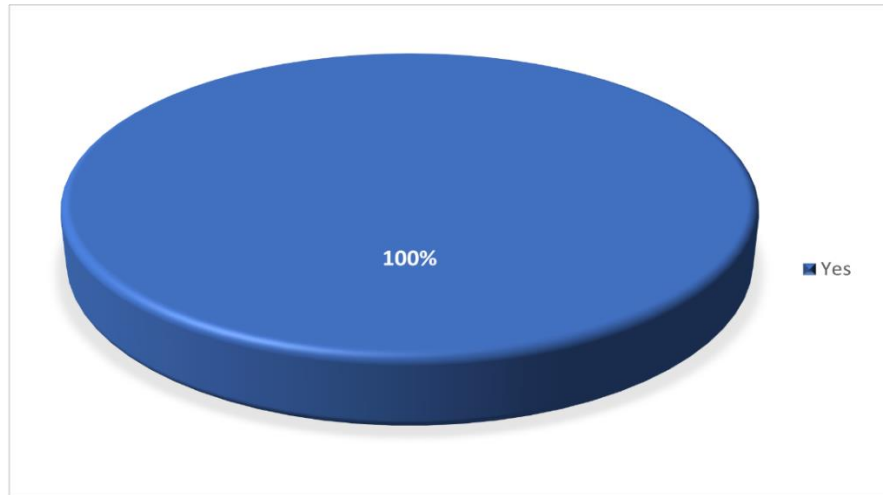
The pie above provides a breakdown of respondents by their socio-professional category, revealing the distribution of different roles within the company. Out of a sample of 20 people, we can see that the majority of respondents are supervisors, making up 80% of the total, while Executives and technicians are equally represented, each constituting 10% of the respondents. The socio-professional category distribution indicates that supervisors are the primary users of the EPAL.GED DMS at EPAL, evidenced by their 80% representation among the respondents. This reflects the reality that supervisors are the most frequent users of the DMS, given their key roles in handling and managing documents, information, and decisions within the company. This high engagement with the system highlights its importance in facilitating their tasks and improving their efficiency.

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E.Q5: Do you use the EPAL.GED system?

This graph depicts the frequency of usage of the EPAL.GED system among employees:

Graph 5: Usage of the EPAL.GED System



Source: Made by us on the basis of the results of the questionnaire” using Ms Excel”

Comments:

All respondents (100%) are users of the EPAL.GED system. This indicates complete adoption of the system among the surveyed employees. The universal usage suggests that the EPAL.GED system is an integral part of the company's operations. It is likely a mandatory tool for all employees, which highlights its importance in daily tasks and overall workflow and its usage percentage demonstrates the system's key function in facilitating work processes at EPAL.

F.Q6: If your answer is no, why?

This table lists the reasons provided by employees for not using the EPAL.GED system:

Table 1: Reasons of not using EPAL.GED system

Answers	Fréquence	Pourcentage
No	0	0%

Source: Our survey data” Results obtained with SPSS software”.

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Comments:

The survey included a follow-up question for respondents who did not use the EPAL.GED system: "If your answer is no, why?" However, since all respondents indicated that they use the EPAL.GED system (100% usage), there were no responses to this question. This highlights the system's integral role within the company.

Table 2: The verification level of the variable in light of the relative weight

Verification level	very low	low	moderate	high	Very high
Relative weight	1 - 1,8	1,81 - 2,60	2,61 - 3,40	3,41 - 3,20	4,21 - 5,00

Created by us

G.Q7: Does the EPAL.GED facilitate information and document management processes compared to traditional methods?

This table compares responses on the EPAL.GED system versus traditional document management methods:

Table 3: Responses on EPAL.GED vs. Traditional Document Management Methods

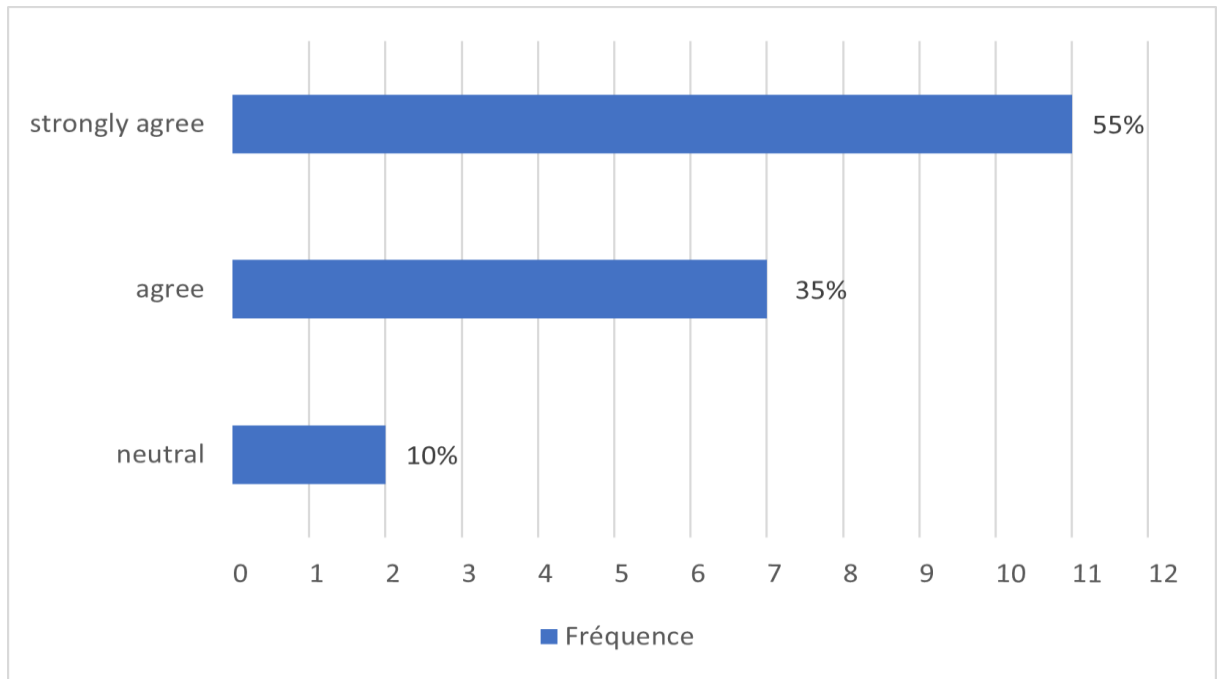
	Fréquence	Pourcentage	Mean	Standard Deviation
Neutral	2	10%	4,45	0,686
Agree	7	35%		
Strongly agree	11	55%		
Total	20	100%		

Source: Our survey data” Results obtained with SPSS software”.

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This graph depicts the frequency of usage of the EPAL.GED system among employees:

Graph 6: The effectiveness of the EPAL.GED System compared to traditional methods



Source: Made by us on the basis of the results of the questionnaire” using Ms Excel”

Comments:

From the chart above we can see that the majority of respondents believe that EPAL.GED facilitates information and document management processes compared to traditional methods. 55% strongly agrees that EPAL.GED improves the management of information and documents. while 9 respondents are evenly split between agreeing (35%) and staying neutral (10%).

- The mean response is 4.45, which falls between "Agree" (4) and "Strongly Agree" (5).
- This high mean suggests that, on average, respondents tend to agree or strongly agree that the EPAL.GED system facilitates information and document management processes compared to traditional methods.
- Since the standard deviation is 0.686 it indicates that while there is some variability in responses, most responses are close to the mean., showing a general agreement among respondents.

This indicates a positive overall evaluation towards the EPAL.GED system's effectiveness in improving document management processes.

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The absence of negative responses further reinforces the system's perceived effectiveness. This analysis highlights the overall satisfaction and perceived benefits of using the EPAL.GED system among the surveyed employees.

H.Q8: Have you observed a reduction in costs related to (paper, storage equipments, workforce.) after the integration of the EPAL.GED system?

This table presents the frequencies of responses regarding cost reductions post EPAL.GED integration:

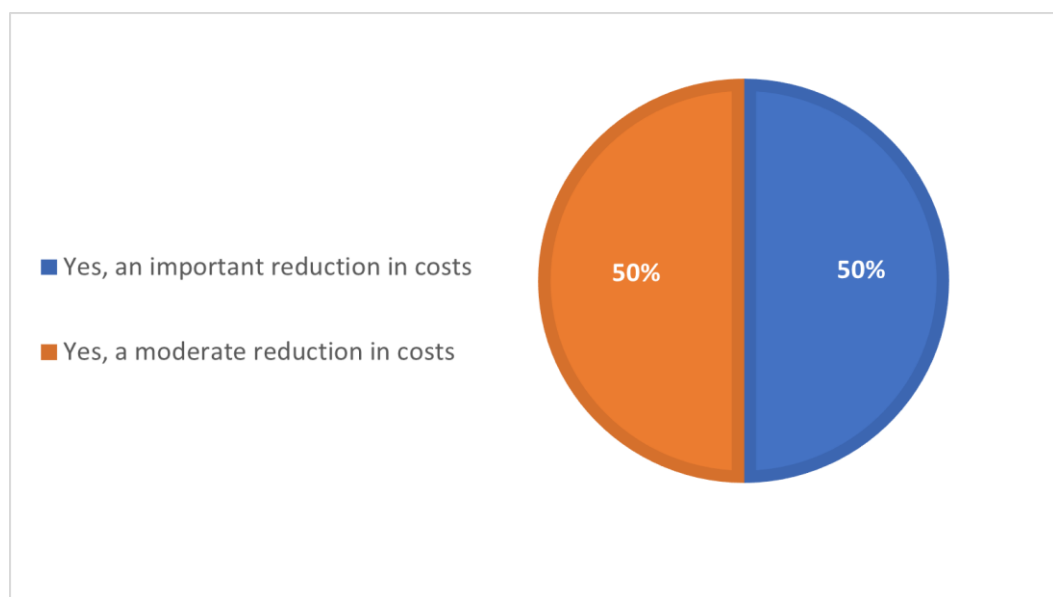
Table 4: Response Frequencies on Cost Reduction After EPAL.GED Integration

Answers	Frequency	Percentage
Yes, an important reduction in costs	10	50%
Yes, a moderate reduction in costs	10	50%
Total	20	100%

Source: Our survey data," Results obtained with SPSS software".

This graph presents observations related to cost reductions after implementing the EPAL.GED system:

Graph 7: Cost Reduction Observations



Source: Made by us on the basis of the results of the questionnaire" using Ms Excel"

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Comments:

- 100% of respondents observed level of cost reduction after integrating EPAL.GED, indicating an equal impression of cost advantages.
- As we see in the pie chart, the responses are evenly split, with 50% of respondents reporting an important reduction in costs and 50% reporting a moderate reduction.
- According to the results, respondents observe a cost reduction as a consequence of integrating the EPAL.GED system, with a comparable split between those who detect an important decrease and those who notice a modest reduction. This strong positive feedback highlights the cost-effectiveness of EPAL.GED. The primary reasons for these cost savings include reduced paper usage, decreased printing equipment expenses, lower storage equipment costs, and a reduced workforce needed for document distribution, especially in environments where departments are geographically separated. These factors collectively underscore the significant financial benefits of the EPAL.GED system.

I.Q9: Has the automation of document management helped optimize work time?

This table shows response frequencies related to work time optimization following the use of EPAL.GED:

Table 5: Response Frequencies on Work Time Optimization

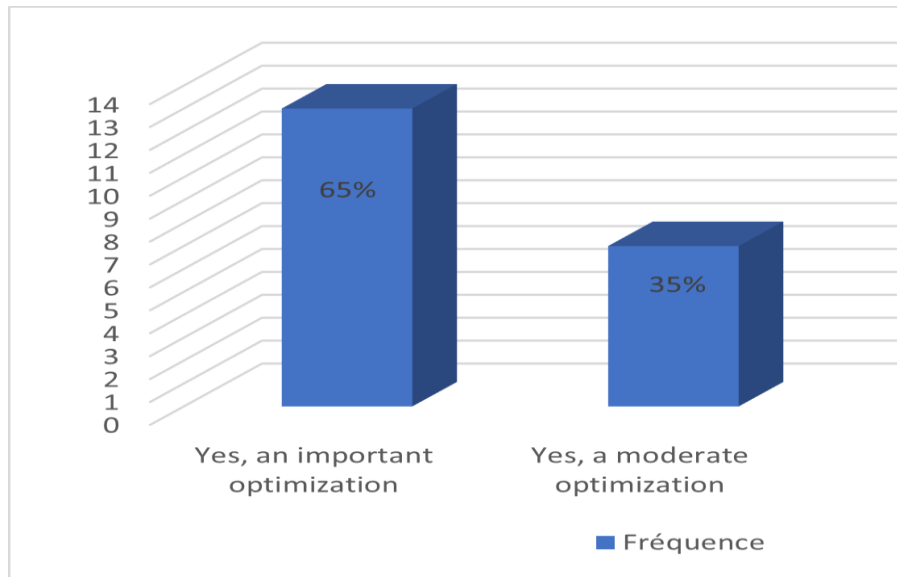
Answers	Fréquence	Pourcentage
Yes, an important optimization	13	65%
Yes, a moderate optimization	7	35%
Total	20	100%

Source: Our survey data” Results obtained with SPSS software”.

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This graph illustrates the optimization of work time as a result of using the EPAL.GED system:

Graph 8: Work Time Optimization



Source: Made by us on the basis of the results of the questionnaire” using Ms Excel”

Comments:

From the chart above, we notice that

- All respondents (100%) agree that automation has contributed work time in some way.
- 65% of respondents believe that the automation of document management has led to an important optimization of work time.
- 35% of respondents see a moderate optimization in work time due to the automation.

The analysis points out that the automation of document management has effectively optimized work time, with 65% of respondents noting significant optimization and 35% noting moderate. This optimization is attributed to several factors: the fast workflow of documents and decisions, real-time access to information without delays, and automated processes such as document routing, approval workflows, and notifications. Additionally, by digitizing documents, the EPAL.GED system reduces the need for physical storage, saving the time and effort associated with managing physical files. These improvements simplify operations and significantly reduce manual tasks, leading to improving overall efficiency.

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J.Q10: EPAL.GED has improved access to information in which way

This table displays response frequencies on the improvement of information access due to the EPAL.GED system:

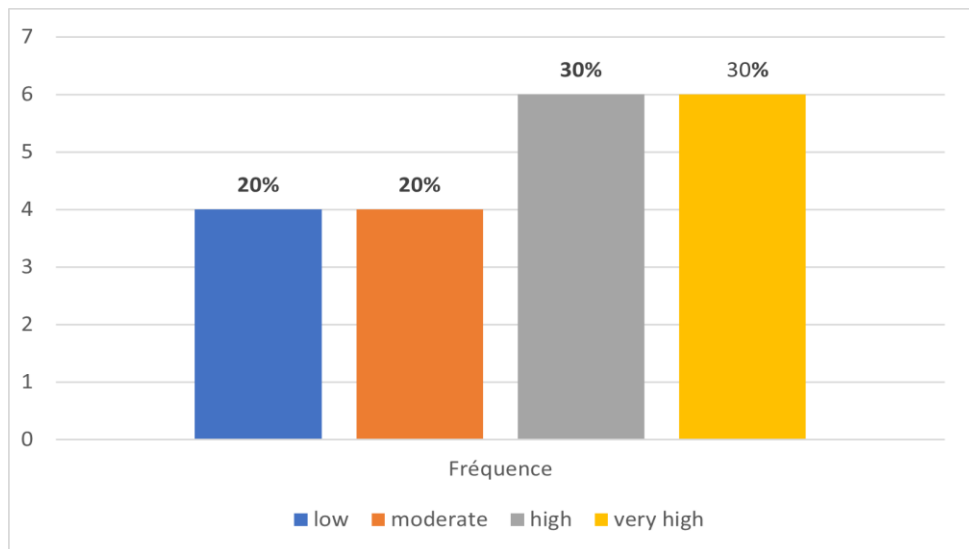
Table 6: Response Frequencies on information access improvement provided by the EPAL.GED system

Answers	Fréquence	Pourcentage	Mean	Standard Deviation
Low	4	20%	3,70	1,129
Moderate	4	20%		
High	6	30%		
Very high	6	30%		
Total	20	100%		

Source: Our survey data," Results obtained with SPSS software".

This graph shows how the EPAL.GED system has improved information access for employees.:

Graph9: Information access improvement provided by the EPAL.GED system



Source: Made by us on the basis of the results of the questionnaire" using Ms Excel"

Comments:

From the chart and table of frequencies above, 20% of respondents express that the improvement in access to information is low, another 20% rate the improvement as moderate,

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while 30% of respondents feel that the improvement is high and 30% perceive the improvement as very high.

A majority (60%) rate the improvement as high or very high, indicating a generally positive perception of EPAL.GED's contribution on information access.

The mean response is 3.70, leaning towards the higher end of the scale.

The standard deviation of 1.129 indicates a moderate spread of responses, suggesting some variability in perceptions of improvement.

EPAL.GED System improved access to information by centralizing documents in a single, organized repository with advanced search capabilities, making retrieval quick and easy, ensuring efficient access. Additionally, any information needed is already available in the system database, eliminating the time wasted manually searching through stored file sheets.

K.Q11: After the introduction of EPAL.GED, has the organization become more flexible?

This table highlights response frequencies on organizational flexibility post-EPAL.GED integration:

Table 7: Response Frequencies on Organizational Flexibility After EPAL.GED integration

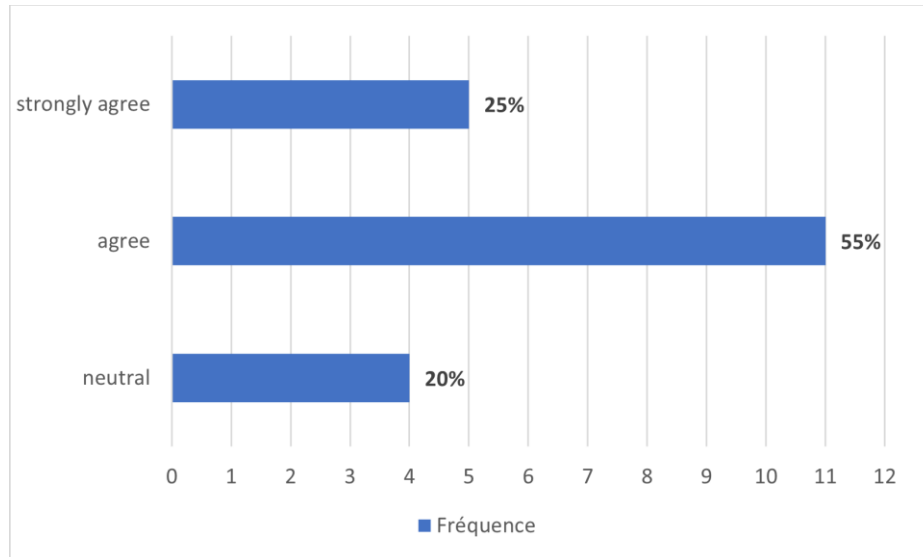
Answers	Fréquence	Pourcentage	Mean	Standard Deviation
Neutral	4	20%	4,05	0,686
Agree	11	55%		
Strongly agree	5	25%		
Total	20	100%		

Source: Our survey data” Results obtained with SPSS software”.

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This graph displays the perceived improvement in organizational flexibility due to the EPAL.GED system:

Graph 10: Organizational Flexibility



Source: Made by us on the basis of the results of the questionnaire” using Microsoft Excel”

Comments:

The chart shows that a majority of respondents, specifically 55%, agree that the organization has become more flexible after the integration of EPAL.GED. Furthermore, 25% of the respondents strongly agree with the statement, indicating a significant level of approval and perceived improvement. On the other hand, 20% of the respondents are neutral regarding this statement.

The mean response is 4.05, suggesting a general agreement that the organization has become more flexible.

The standard deviation of 0.686 indicates a moderate level of agreement and some variability in responses.

the introduction of EPAL.GED has positively contributed the organization's flexibility with 80% of respondents agreeing or strongly agreeing, so any information or decision that is suddenly updated or modified reaches employees in real time without expectation, which means that everyone is informed about the change simultaneously, allowing these updates to be

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implemented on time without delays. This demonstrates the ability of the company to adapt to the quick expansion.

L.Q12: Evaluate the contribution of EPAL.GED to organizational efficiency

These two followed tables evaluate the contribution of the EPAL.GED system to organizational efficiency:

Table 8: Evaluation of EPAL.GED's Contribution to Organizational Efficiency

Answers	administrative efficiency		collaboration		reliability of information		decentralization of decision	
	0	0%	0	0%	0	0%	0	0%
Not at all	0	0%	0	0%	0	0%	0	0%
A little	0	0%	0	0%	1	5%	2	10%
Moderately	4	20%	3	15%	2	10%	5	25%
A lot	9	45%	10	50%	10	50%	7	35%
Considerably	7	35%	7	35%	7	35%	6	30%
Total	20	100%	20	100%	20	100%	20	100%

Source: Our survey data” Results obtained with SPSS software”.

Table 9: Descriptive Statistics of EPAL.GED's contribution on Organizational Efficiency

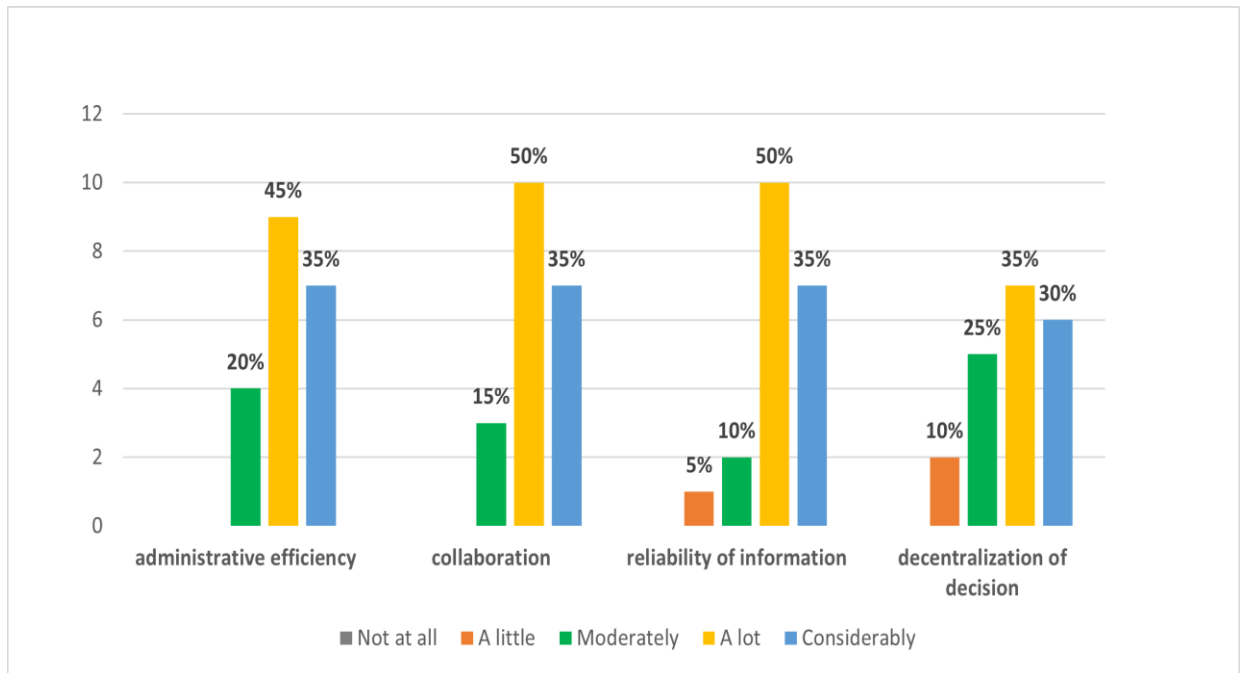
Question	Mean	Standard Deviation
EPAL.GED has improved administrative efficiency	4,15	0,745
.GED has improved collaboration	4,20	0,696
EPAL.GED has improved the reliability of information	4,15	0,813
EPAL.GED has promoted decentralization of decision	3,85	0,988

Source: Our survey data” Results obtained with SPSS software”

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This graph highlights the contribution of the EPAL.GED system to organizational efficiency:

Graph 11: Contribution on Organizational Efficiency



Source: Made by us on the basis of the results of the questionnaire” using Ms Excel”

Comments:

From the chart and table above, we notice that there are four different axes that contributed by EPAL.GED system.

Firstly, 80% of respondents (45% a lot, 35% considerably) report that EPAL.GED contributes significantly to administrative efficiency, while 20% see a moderate improvement.

Secondly, the majority of respondents 85% (50% a lot, 35% considerably) think that EPAL.GED system greatly contribute collaboration, while others stated that its moderately (15%).

Thirdly, saying that EPAL.GED has contributed reliability of Information, most of respondents went with (35%) considerably and (50%) a lot, while the rest varied between the choices of “moderately (10%)”, “a little (5%)”.

Finally, 65% of respondents (35% a lot, 30% considerably) state that EPAL.GED helps a lot in decentralizing decision-making, while 25% see a moderate contribution, the rest 10% indicated that EPAL.GED contributed the decentralization only in a little way.

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The average of these mean scores can be calculated to provide a general summary about EPAL.GED's contribution on "Organizational Efficiency"

$$\text{Overall Mean} = \frac{4.15+4.20+4.15+3.85}{4} = \frac{16.35}{4} = 4.0875$$

The overall mean score of 4.09 indicates that, on average, respondents perceive EPAL.GED to have a very strong contribution on various aspects of organizational efficiency.

EPAL.GED system contributes organizational efficiency by automating administrative tasks, streamlining workflows which enables that every thing is organized every thing is on the time. It fosters collaboration through centralized access, real-time updates, and speed up the communication, ensuring teams work with the latest information and a faster work process.

It improves the reliability of information with effective archiving and data quality, possessing all information and documents electronically makes this data reliable and secure against manipulation.

Additionally, it supports decentralized decision-making by allowing the decision-making authority distributed throughout a larger group of employees via the system, providing easy access to necessary documents, empowering employees to be informed quickly. Overall, EPAL.GED system creates a more agile, responsive, and productive organization.

L.Q13: Do you agree that EPAL.GED has improved the quality of work within your organization?

This table reports the frequencies of employee agreement on the contribution of EPAL.GED to work quality:

Table 10: Frequencies of Employee Agreement on EPAL.GED's contribution on "Work Quality"

Answers	Fréquence	Pourcentage	Mean	Standard Deviation
Neutral	3	15%	4,10	0,641
Agree	12	60%		
Strongly agree	5	25%		
Total	20	100%		

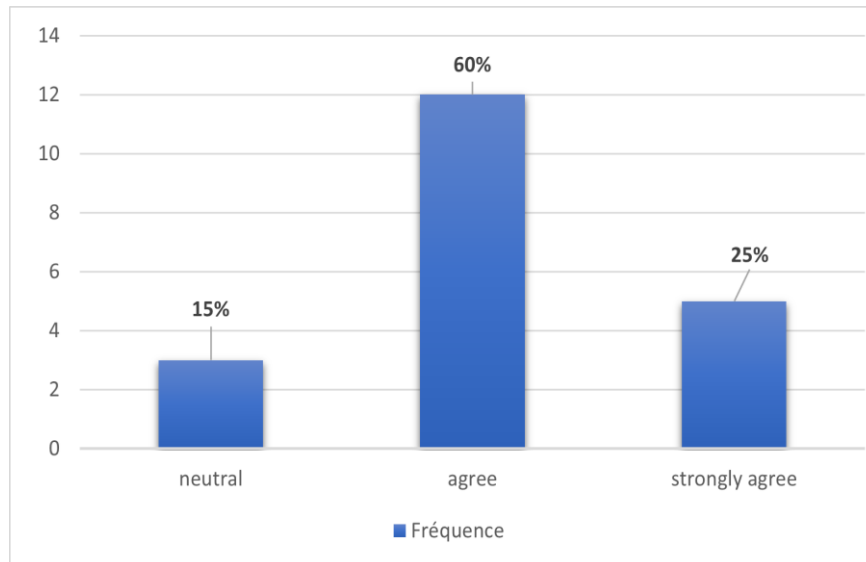
Source: Our survey data," Results obtained with SPSS software"

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This graph examines the impact of the EPAL.GED system on the quality of work:

:

Graph 12: EPAL.GED's contribution on Work Quality



Source: Made by us on the basis of the results of the questionnaire” using Ms Excel”

Comments:

The chart above shows that 15% of respondents chose the neutral response, indicating neither agreement nor disagreement, while the majority, 60%, agree that EPAL.GED has improved the quality of work within the organization and 25% of respondents strongly agree with the statement.

The high mean score 4.10, suggests a high level of agreement among respondents.

With a standard deviation of 0.641, there is relatively low variability in response.

Key factors contributing to this improvement with 85% of respondents agreeing or strongly agreeing that EPAL.GED has improved work quality through detailed effective planning and organization, effective communication, adaptability, and the use of advanced technology and automation tools. These aspects collectively improve efficiency, accuracy, and productivity, leading to a significant improvement in the overall quality of work.

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M.Q14: The contribution of EPAL.GED to the employee's productivity

The two tables present statistics regarding the EPAL.GED system's contribution to productivity:

Table 11: Frequencies of Employee Agreement on EPAL.GED's Contribution to Employees Productivity

Answers	an improvement in employee satisfaction during the execution of their work		an improvement in employee engagement		EPAL.GED has reduced errors and delays in processing	
	Count	Percentage	Count	Percentage	Count	Percentage
Not at all	0	0%	0	0	0	0%
A little	0	0%	1	5%	1	5%
Moderately	7	35%	7	35%	3	15%
A lot	10	50%	9	45%	10	50%
Considerably	3	15%	3	15%	6	30%
Total	20	100%	20	100%	20	100%

Source: Our survey data" Results obtained with SPSS software".

Table 12: Descriptive Statistics on EPAL.GED's Contribution to Employee Productivity

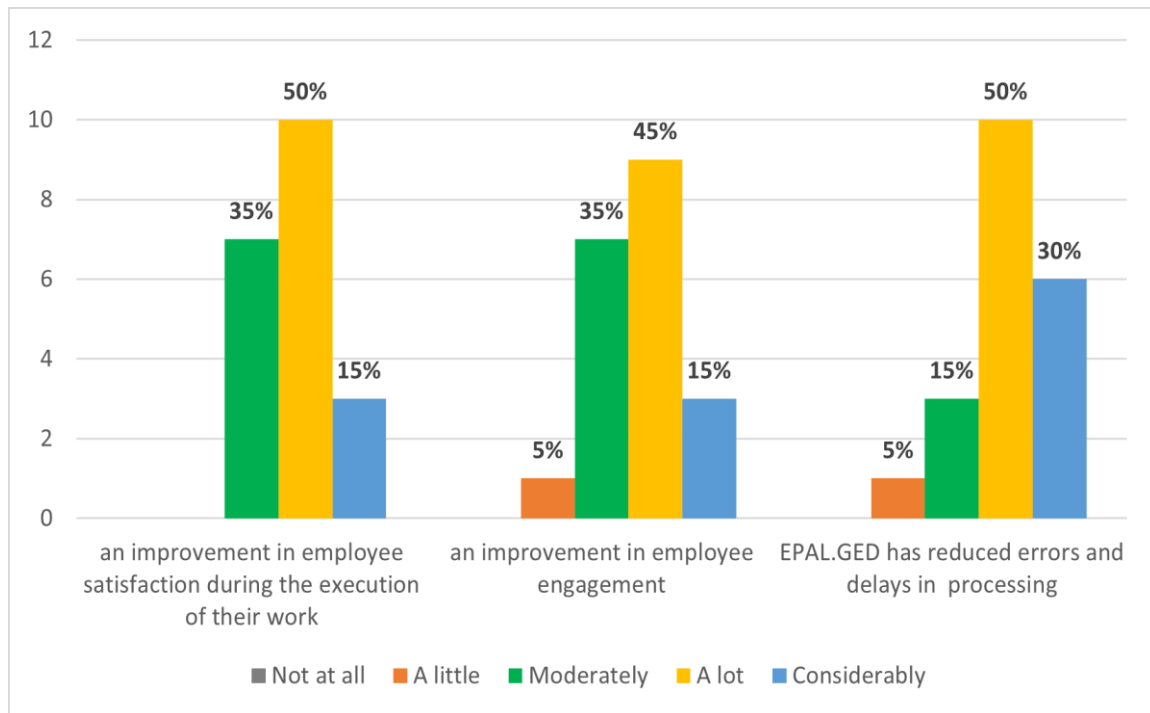
Question	Mean	Standard Deviation
an improvement in employee satisfaction during the execution of their work	3,80	0,696
an improvement in employee engagement	3,70	0,801
EPAL.GED has reduced errors and delays in processing	4,05	0,826

Source: Our survey data" Results obtained with SPSS software".

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This graph assesses how the EPAL.GED system has contributed to employee productivity:

Graph 13: EPAL.GED's Contribution to Employees Productivity



Source: Made by us on the basis of the results of the questionnaire” using Ms Excel”

Comments:

From the chart 50% (a lot) and 15% (Considerably) of respondents perceive a significant improvement in employee satisfaction due to EPAL.GED and while (35%) chose as moderately an answer.

On the other hand, when we asked about the employee engagement, we notice in the chart that that 70% of respondents (35% moderately, 45% a lot) believe that EPAL.GED has improved employee engagement with 15% went with considerably and the rest 5% think that it improved it a little.

Concerning the reduction of errors and delays in processing the answers were close to each other, (95%) of respondents (15%) moderately, (50%) a lot, 30% considerably agree that EPAL.GED has reduced errors and delays with one respondent (5%) think that the contribution of EPAL.GED led to a reduction of errors and delays in processing in a little way.

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As the system automate the work process, it helps to make executing tasks easy and effortless, which contributes to employee satisfaction in their work.

Since the system facilitates access to information and also supports collaboration, therefore employees are more committed to work in order to achieve organization goals as we see this led to higher engagement levels.

EPAL.GED allows for strict access controls and permissions, ensuring that only authorized personnel can view or edit documents. This maintains document integrity and minimizes the risk of human error and processing delays.

By improving satisfaction, engagement, and reducing errors and delays, the system has effectively enhanced overall efficiency and effectiveness in the workplace. These findings underscore the importance of EPAL.GED in facilitating a more productive and successful organizational environment.

Main Results

Based on the findings of our study with 20 employees within the Port Corporation of Algeria, we have reached a number of interesting observations that are worth recalling.

First of all, we are going to summarize the answers of the interview and the questionnaire to bring out the main recommendations concerning qualitative and quantitative analysis. According to questionnaire and interview results we conclude the following:

- The survey had a total of 20 respondents, with a slightly higher representation of females (55%) compared to males (45%). This gender distribution aligns with the company's workforce composition.
- (40%) of our interviewees falls within the 35-44 years age range.
- (35%) of respondents have been in their current position for less than 5 years.
- Our survey was destined mostly to supervisors in the firm (80%).
- All respondents (100%) reported using the EPAL.GED system, indicating complete adoption and highlighting its integral role in the company's operations.
- The survey also revealed that the majority of respondents (90%) agree or strongly agree that EPAL.GED facilitates information and document management processes compared to traditional methods.

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- 100% of respondents observed a reduction in costs related to paper, storage equipment, and workforce after integrating EPAL.GED. The responses were evenly split between important (50%) and moderate (50%) cost reductions. This feedback underscores the system's cost-effectiveness.
- Furthermore, all respondents acknowledged that automation through EPAL.GED has optimized work time, with 65% noting significant optimization.
- EPAL.GED has improved access to information, with 60% of respondents rating the improvement as high or very high, reflecting a positive perception of the system's contribution to information access.
- Additionally, 80% of respondents agree or strongly agree that the organization has become more flexible post-EPAL.GED integration.
- The overall mean score for EPAL.GED's contribution to organizational efficiency was 4.09, indicating a very strong contribution across various aspects such as administrative efficiency, collaboration, reliability of information and decentralization of decision-making. This highlights the system's significant contribution on organizational efficiency.
- Lastly, 85% of respondents agree or strongly agree that EPAL.GED has improved the quality of work within the organization. Key factors contributing to this improvement include detailed planning and organization, effective communication, adaptability, and the use of advanced technology and automation tools.
- The survey revealed significant improvements in employee satisfaction (65% noting a lot or considerable improvement), engagement (70% noting a lot or considerable improvement), and a reduction in errors and delays in processing (95% noting moderate to considerable improvement). These findings underscore EPAL.GED's role in enhancing overall efficiency and effectiveness in the workplace.

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Conclusion

Throughout this chapter, we have employed techniques that have enabled us to demonstrate that the EPAL.GED system has had a significant contribution on various aspects of organizational performance at EPAL. First of all, the interview led us to define the EPAL.GED system and its functions. Furthermore, the implementation of the dual questionnaire technique allowed us to delve deeper into how the system has facilitated information and document management through many aspects financially, organizationally and operationally.

General Conclusion

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This research focused on the contribution of integrating information systems to the improvement of the Planning & IT department performance within the port Corporation of Algeria. The objective was to investigate and demonstrate how integrating a Document Management System as EPAL.GED can improve its efficiency, productivity, effectiveness, and its overall organizational performance.

In the first part of the literature, we began by discussing the relationship between information systems and Company's performance. We discussed the evolution, definition, and components of information systems, and classifying them, highlighting their roles in improving the company's processes. We then delved into the definition of a company's performance, outlines its various types and objectives, and describes performance measurement methods. Our main focus revolved around how integrated information systems improving Company's performance as, as it formed the core subject of our research.

To carry out our research successfully, we initially chose a qualitative approach by employing the method of a structured interview. This was followed by a quantitative approach, where we developed an online questionnaire. The objective of this research is to validate the hypotheses proposed in the conceptual model.

To address our research problem and after presenting and interpreting the results of our survey, we confirmed the three hypotheses, which are as follows:

Hypothesis 01: • Integrating information systems within EPAL can lead to cost reduction.

The results gained from our study, have shown clearly that the hypothesis is confirmed, the company observed a reduction in costs after integrating EPAL.GED system, the cost savings are attributed to factors such as reduced paper usage, decreased expenses on printing and storage equipment, and a reduced workforce needed for document distribution. The findings indicate that integrating information systems within EPAL, primarily by using the EPAL.GED system, generates considerable cost savings and demonstrates the company's financial efficiency.

• Hypothesis 02: Integrating information systems within the EPAL company contributes to a better-organized and more effective operations.

Based on the questionnaire results, Hypothesis 02—"Integrating information systems within EPAL contributes to better-organized and more effective operations"—is confirmed.

General Conclusion

According to the respondents confirm that EPAL.GED has a beneficial effect on optimizing work time, improving access to information, and increasing organizational flexibility. The system expanded administrative efficiency, collaboration, and information reliability. In addition, EPAL.GED promotes decentralized decision-making and has greatly improved work quality. These findings directly address key aspects of organizational efficiency and prove that EPAL.GED system has contributed develop a more organized and effective operational environment at EPAL.

Hypothesis 03: The integration of information systems improves the productivity of employees within EPAL.

As a result, we are able to confirm the third and final research hypothesis which is the integration of information systems improves the productivity of employees within EPAL. EPAL.GED's automation features have made tasks simpler and more efficient, which has, in turn, increased productivity, many employees report feeling more satisfied and committed to their work, attributing this positive contribution to the streamlined processes facilitated by the system, Furthermore, the system's contribution on reducing errors and delays in processing has been positively noted, with a large majority acknowledging this benefit.

Limitations:

However, we cannot claim that this research work is free from limitations. Some theoretical and methodological limitations are as follows:

- The absence of indicators to evaluate the system's performance.
- The sample size was the study's principal limitation. This was due to scheduling constraints of EPAL employees.
- One of the theoretical limits is the study of performance in global way. Indeed, because performance is a nebulous and imprecise concept, it cannot be reduced to only some dimensions.

General Conclusion

Recommandation, and perspective

Recommandation:

- It would be beneficial to integrate Key Performance Indicators (KPIs) to systematically evaluate and enhance the performance of the EPAL.GED system.
- It is advisable to smoothly integrate EPAL.GED with other enterprise systems like ERP, CRM, and HRM to streamline workflows and facilitate data sharing across departments.
- It could be helpful to enhance search functionalities with advanced filters, tags, and metadata to make information retrieval faster and more accurate.
- It would be advantageous to implement a system for regular user feedback to identify pain points and areas for improvement.

Perspective:

We expect in the future research works that students go to Study the impact of integrating Internet of Things (IoT) devices with information systems. IoT can provide real-time data from various sources, improving decision-making and operational efficiency, especially in industries like manufacturing, logistics, and healthcare.

Finally, we hope that this research, however modest it may be, can draw attention to the value of integrating advanced information systems to optimize company's effectiveness and efficiency. we aim to encourage further exploration and implementation of similar technologies across various sectors, ultimately fostering more dynamic organizational environments.

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APPENDIXES

APPENDIX NO. 1: 'the interview guide'

Q1: What is your position in the company and what are your responsibilities?

Q2: What information system have you integrated?

Q3: When was this integrated implemented?

Q4: What were the problems and needs that led to the integration of EPAL.GED system?

Q5: What goals were pursued?

Q6: What are the functions of EPAL.GED system?

Q7: Have you observed any reduction in lead times or cost savings as a result of this integration?

Q8: How has the integration of the DMS contributed to collaboration, communication, and productivity within the company?

Q9: Has the integration of the EPAL.GED system improved the efficiency of work processes within your department and between teams?

Q10: Do you use indicators to monitor the performance of the EPAL.GED system? If yes, which ones?

APPENDIX NO. 2: Questionnaire

la contribution de l'intégration du système EPAL.GED sur la performance de l'entreprise

Merci de prendre le temps de répondre à ce questionnaire. Vos réponses nous aideront à comprendre la contribution de l'intégration du système "EPAL.GED" Sur la performance de l'entreprise . Ce questionnaire est anonyme, et les informations recueillies seront utilisées uniquement à des fins académiques.

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Non partagé

* Indique une question obligatoire

Gender *

- masculin
- féminin

Age range *

- 25-34 ans
- 35-44 ans
- 45 et plus

How long have you been in your current position at EPAL? *

- Moins de 5 ans
- Entre 5 et 10 ans
- Entre 10 et 20 ans
- Plus de 20 ans

Socio-professional category *

- Cadre
- agent de maîtrise
- Exécutant

Do you use the EPAL.GED system? *

- oui
- non

If your answer is no, why?

Votre réponse

Does the EPAL.GED facilitate information and document management processes compared to traditional methods? *

- Pas du tout d'accord
- Pas d'accord
- Neutre
- D'accord
- Fortement d'accord

Have you observed a reduction in costs related to (paper, storage equipments, workforce ...) after the integration of the EPAL.GED system? *

- Oui, une réduction importante des coûts
- Oui, une réduction modérée des coûts
- Non, aucune réduction des coûts

Has the automation of document management helped optimize work time? *

- Oui, une optimisation importante
- Oui, une optimisation modérée
- Non, aucune optimisation

EPAL.GED has improved access to information in a way that is: *

- Très faible
- Faible
- moyen
- Fort
- Très fort

After the introduction of EPAL.GED, has the organization become more flexible? *

1 2 3 4 5

Tout à fait en désaccord Tout à fait d'accord

Evaluate the contribution of EPAL.GED to organizational efficiency: *

	Pas du tout	un peu	moyennement	beaucoup	considérablement
EPAL.GED a amélioré l'efficacité administrative	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EPAL.GED a renforcé la collaboration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EPAL.GED a amélioré la fiabilité des informations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EPAL.GED a favorisé la décentralisation des décisions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Do you agree that EPAL.GED has improved the quality of work within your organization? *

1 2 3 4 5

Tout à fait en désaccord Tout à fait d'accord

The contribution of EPAL.GED to the employees productivity *

	Pas du tout	peu	moyennement	beaucoup	considérablement
EPAL.GED a conduit à une amélioration de la satisfaction du personnel lors L'exécution de leur travail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EPAL.GED a conduit à une amélioration des connaissances du personnel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EPAL.GED a réduit les erreurs et les retards dans le traitement des courriers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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