Business management: Case study applied to Brazilian army information systems

https://doi.org/10.56238/sevened2024.010-026

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ABSTRACT

This article examines the integration between Business Management and Information Systems within the Brazilian Army, highlighting how this confluence supports strategic and operational objectives in a military context. Focusing on the effective structuring of data and information with a view to facilitating usability and accessibility, the study investigates the management of resources and the application of information systems with a view to optimizing organizational performance and continuous improvement. Using a methodology consisting of document analysis, bibliographical research and field studies, including interviews and direct observations, the aim is to evaluate the efficiency of current practices and identify possible gaps and challenges faced by the institution. The relevance of this study is underlined by the need for business management approaches that are innovative, sustainable and socially responsible, especially considering the specific demands of security, secrecy and operational effectiveness inherent to military institutions. In addition, the article proposes an Information Architecture for strategic information management where the benefits of business management are discussed based on the GPD and PDCA methodologies that promote a systematic and objective-oriented approach that is fundamental to achieving consistent results in line with the Brazilian Army's strategic guidelines.

Keywords: Information Architecture, Business Management, Information Systems.

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INTRODUCTION

The intersection between Business Management and Information Systems represents a dynamic and crucial field for organizational success (Jabłoński & Jabłoński, 2020). This confluence focuses on the strategic *design* and organization of information, ensuring data is accessible, understandable and usable to support business objectives and operational requirements.

It is initially worth highlighting that: Information Architecture (AI) refers to the structuring of information and data within digital systems and environments to facilitate usability and findability (Kuhn Cuellar et. al., 2022); Business Management focuses on managing business resources, strategies and operations to achieve organizational objectives (Al-Omari et. al., 2022); Information Systems (IS) consists of an integrated set of technological and operational components designed to collect, store, process and distribute information (Benning, 2020).

The objective of this study is to analyze IS in the Brazilian Army (EB), specifically in the context of business management. The aim is to investigate how these systems are used, their benefits and challenges and the impact of their application. In view of this, an Information Architecture will be proposed to improve data processing, through mapping the information flow and identifying methodologies for business management.

The topic of business management applied to IS in EB is relevant due to the strategic importance that information management has in organizations. In the military context, effective management impacts information security, strategic decision-making and the operational performance of the armed force. Therefore, understanding how EB uses IS to manage its business is essential to improve practices and direct future actions.

THEORETICAL FOUNDATION

Information management contributes to achieving organizational objectives and information for its success (dos Santos & Damian, 2020). Strategic information management involves interdependent processes, such as: identifying, acquiring, organizing and storing, developing products and services, distributing and using information (de Carvalho Dutra & Barbosa, 2020; Monteiro & Duarte, 2018; Tarapanoff, 2002).

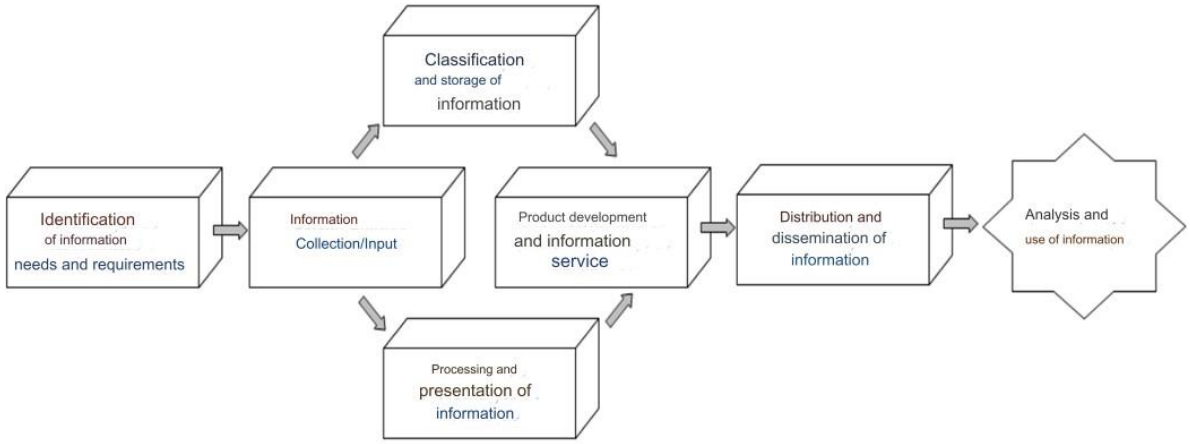
This information management model provides:

> "Compatible objectives and methodologies for the entire information environment, and requires knowledge of the organization and the business, as well as methodologies and techniques for organizing and processing information, combined with a generic vision of technology, in order to manage information as a economic and strategic resource essential to the effectiveness of companies and government" (Cianconi, 1991 apud Tarapanoff, 2002).

Following the same line of thought, Taleby Ahvanooey et. al., (2023), dos Santos et. al., (2022), McGee & Crowley-Koch (2021), Da Cruz et. al., (2020) address a model that, by mapping

strategic data related to an organization's processes, IS development is possible, as exemplified in Figure 1.

Figure 1: Strategic Information Management Model.



Source: Santos (2023). The figure represents the steps necessary for strategic information management.

The model consists of 6 (six) steps that allow information management: identification of needs and requirements; collection/entry; classification/storage and treatment/presentation; development of products and services; distribution and dissemination; analysis and use.

Managing information in an organization is a complex process, which requires understanding the information path, the structures involved, as well as the users present in the process. This process is fundamental to guarantee the efficiency and quality of services provided by an organization oriented to business processes (Taleby Ahvanooey et al., 2023; dos Santos et al., 2022; McGee & Crowley-Koch, 2021; Da Cruz et al., 2020).

Now, **business management** constitutes a multifaceted field of study and practice, which is dedicated to exploring and managing the complexity that characterizes modern organizations (Doblinger, 2023). This domain stands out for adopting a critical approach in the analysis and application of theories and models related to organizational planning, organization, leadership and control.

The primary objective lies in promoting the optimization of organizations' performance in the face of the challenges presented by a business scenario that appears to be globalized and competitive (Palazzeschi & Di Fabio, 2018).

In turn, an **information system** can be understood by:

> "A set of interrelated components that collect (or retrieve), process, store and distribute information intended to support decision-making, coordination and control in an organization. Furthermore, information systems also help managers and workers analyze problems, visualize complex issues, and create new products" (Kenneth et al., 2020).

IS helps organizations to improve the quality of their products or services, in addition to maintaining the consistency of that quality. To be able to improve the quality of the product, service or to ensure consistency, organizations need information from the past as a source of error correction and as a reference point for improvement or consistency (Abraham et al., 2019).

IS generally encompasses: Transaction Processing Systems (SPT), Office Automation Systems, Knowledge Worker Systems (STC), Decision Support Systems (SAD), Management Information Systems (GIS) and Support Systems to the Executive (SAE) (Kenneth et al., 2020). They are classified by categories, types and functions as shown in Figure 2 (Turban et al. 2013 apud Abed & Anupam, 2023).

Figure 2: Classification of IS by categories, types and functions.

Categorias de Sistemas			Tipos de sistemas	Função
TURBAN, RAINER Jr. e POTTER	Sistemas de informação que apoiam grupos de organizações ou Sistemas de informação interorganizações (SIIs)		Sistema de Gerenciamento da Cadeia de Suprimento	Gerenciar fluxo de produtos, serviços e informações entre organizações (p.9).
			Sistemas de Comércio Eletrônico	Permitir transações entre organizações e entre organizações e clientes (p.9).
	Sistemas de informação que apoiam partes de organização	Sistemas de Informação que apoiam áreas funcionais e operações específicas da Organização	Sistemas de Informação de Área Funcional ou Sistemas de Informação Departamentais	Cada sistema de informação apoia uma área funcional específica na organização. Exemplos são SI de contabilidade, SI de finanças, SI de gerenciamento de produção/operação (GPO), SI de marketing e SI de recursos humanos (p.6).
		Sistemas de Informação que apoiam Empregados Organizacionais	Sistemas de Automação de Escritório (SAEs)	[...] apoiar as atividades de trabalho diárias de indivíduos e grupos (p.9). Grupos:[...] equipe de apoio administrativo, os gerentes de níveis inferior e médio e os trabalhadores do conhecimento (p.8).
			Sistemas de Informações Gerenciais (SIG)	Produzir relatórios resumidos dos dados de transação, geralmente em uma área funcional (p.9). Grupos: [...] gerentes intermediários, mas, algumas vezes, também para gerentes de níveis inferiores (p.8).
			Sistemas de Apoio à Decisão (SADs)	Fornecer acesso a dados e a ferramentas de análise (p.9). Grupos: [...] principalmente para gerentes intermediários e trabalhadores do conhecimento (p.8).
			Sistemas Especialista (SEs)	Imitar a experiência humana em determinada área e tomar uma decisão (p.9). Grupos: [...] primordialmente projetados para apoiar os trabalhadores de conhecimento (p.8)
			Sistemas de Informação Executiva (SIEs)	Apresentar aos executivos informações resumidas e estruturadas sobre aspectos importantes da empresa (p.9). Grupos:[...] os altos gerentes da organização (p.8).
	Sistemas de Informação que apoiam Organizações Inteiras		Sistema de Processamento de transações (SPT)	Sistema de informação que apoia o monitoramento, a coleta, o armazenamento e o processamento de dados das transações comerciais básicas da organização (p.19).
			Sistemas de Planejamento de Recursos Empresariais (ERP)	Sistemas que integram firmemente os sistemas de informação de área funcional através de um banco de dados comum (p.19).
	Outros sistemas		Sistemas de Gestão do Relacionamento com o cliente (CRM)	[...] integram dados de clientes de várias fontes organizacionais,analisam-nos e depois apresentam os resultados [...] (p.219).
			Sistemas de Informação Estratégica	[...] proporcionam uma vantagem competitiva que ajuda a organização a implementar suas metas estratégicas e aumentar seu desempenho e produtividade. (p.34).
			Sistema de Gestão do Conhecimento	[...] uso de tecnologias modernas [...] para sistematizar, aprimorar e disseminar a gestão do conhecimento dentro da empresa e entre empresas (p.110).

Source: Turban et al., (2013) apud Abed & Anupam, (2023).

METHODOLOGY

The beginning of data collection was marked by carrying out a documentary analysis that was based on a wide source of references (Fernandes et al., 2018). This procedure focused on extracting relevant data from documents, following previously formulated hypotheses, together with conducting a bibliographic analysis.

Within this context, the approach through documentary and bibliographic analysis revealed the current state of the issue under study, as well as examining already completed research and operational definitions prevalent in academia. This initial stage included an introductory literature review and an exploratory study, both fundamental to identifying and presenting key concepts essential for the research.

The next phase included diving into the study topic through field research, using direct observation at the location of the events studied, in addition to interviews, focus groups and analysis of internal documents. These methodologies facilitated research into business management and information systems in the organization in question.

Structured interviews provided information about the characteristics of the group studied, while direct observation offered a real perspective on the participants' behavior, their social interactions and various organizational and cultural aspects.

A non-probabilistic sample, chosen based on criteria of typicality or intention, was determined within the context of the EB, focusing on those military organizations with direct responsibilities in the management of business and corporate information systems. This study addressed both strategic aspects within the EB, covering a spectrum of military functions (Hernández-Sampieri & Mendoza, 2018) and essential aspects for advisory, management or direction.

The selection aimed to cover the most representative set of the study population, aiming for precision in the conclusions drawn. The choice of participants was based on the researcher's in-depth understanding of the target population (Prodanov & De Freitas, 2013, apud Gil, 2019. Table 1 presents the population and sample.

Eight focus group sessions were conducted, each lasting between one and two hours. Before the start of each session, participants were informed about the specific objectives that the study intended to achieve, which are detailed below:

a) Objective 1: identify which methodologies are adopted in business management.

Purpose: understand which methodological approaches are used to manage and optimize business operations.

Importance: knowing the methodologies adopted helps to understand how teams organize, plan and execute their activities, influencing business efficiency.

Table 1: Population and Sample

Personnel Area	**Business Managers**	
Hierarchical Circle	Universe	Sample
Senior Officers	15	6
Intermediate Officers	3	2
Junior Officers	0	0
Warrant Officers and Sergeants	0	0
Total	18	8

Source: the author, 2023.

b) Objective 2: identify the information flow from the business manager's perspective.

Purpose: Understand how information is collected, processed, stored and distributed within the organization from the perspective of business managers.

Importance: an efficient information flow is vital for decision making, strategic planning and daily operations.

c) Objective 3: identify which methodologies or tools are used to handle the information flow.

Purpose: discover methodologies used to manage the flow of information.

Importance: appropriate tools and methodologies can significantly improve the efficiency of information management and business operation.

d) Objective 4: identify whether the information desired by the customer is present in the Information System.

Purpose: to evaluate whether customers' information needs are effectively met and reflected in the information systems used by EB.

Importance: Ensuring that relevant information is available and easily accessible is crucial to customer satisfaction and business success.

e) Objective 5: identify difficulties encountered in business management.

Purpose: to discover the main challenges and obstacles faced by managers in managing their business.

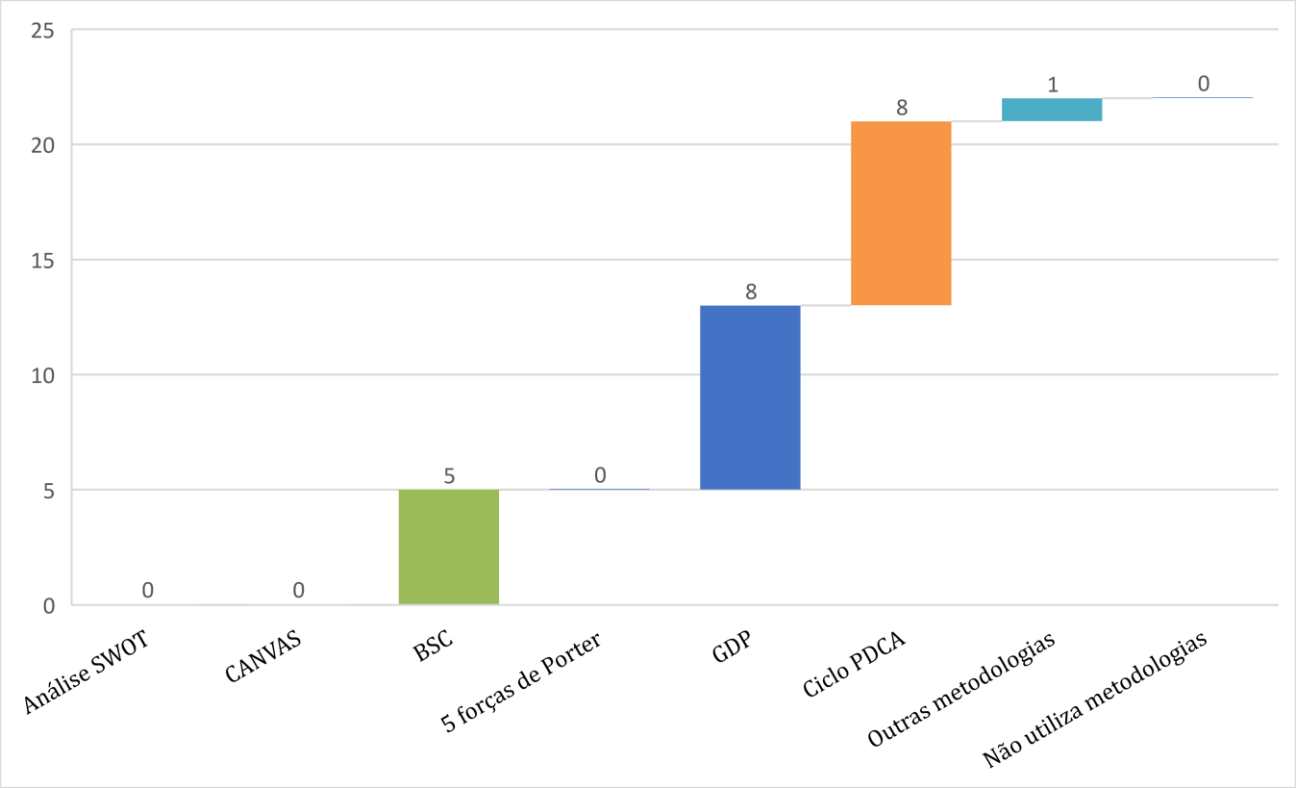
Importance: understanding the challenges faced can provide valuable indications for improvements, innovations and strategies to overcome problems.

RESULTS

METHODOLOGIES ADOPTED IN BUSINESS MANAGEMENT

Each interviewee was able to select which methodologies were used in the business area between 2019 and 2021. The analysis indicates that, while the organization strongly prioritizes Management by Guidelines (GPD), PDCA Cycle and *Balanced Scorecard* (BSC), emphasizing objectives clear and continuous improvement, it does not significantly adopt other methodologies such as SWOT Analysis, CANVAS, or Porter's 5 Forces. This suggests a very specific approach to strategic planning and management, with a particular focus on clear guidelines, performance monitoring and continuous improvement.

Graphic 1: What methodologies are adopted in business management?



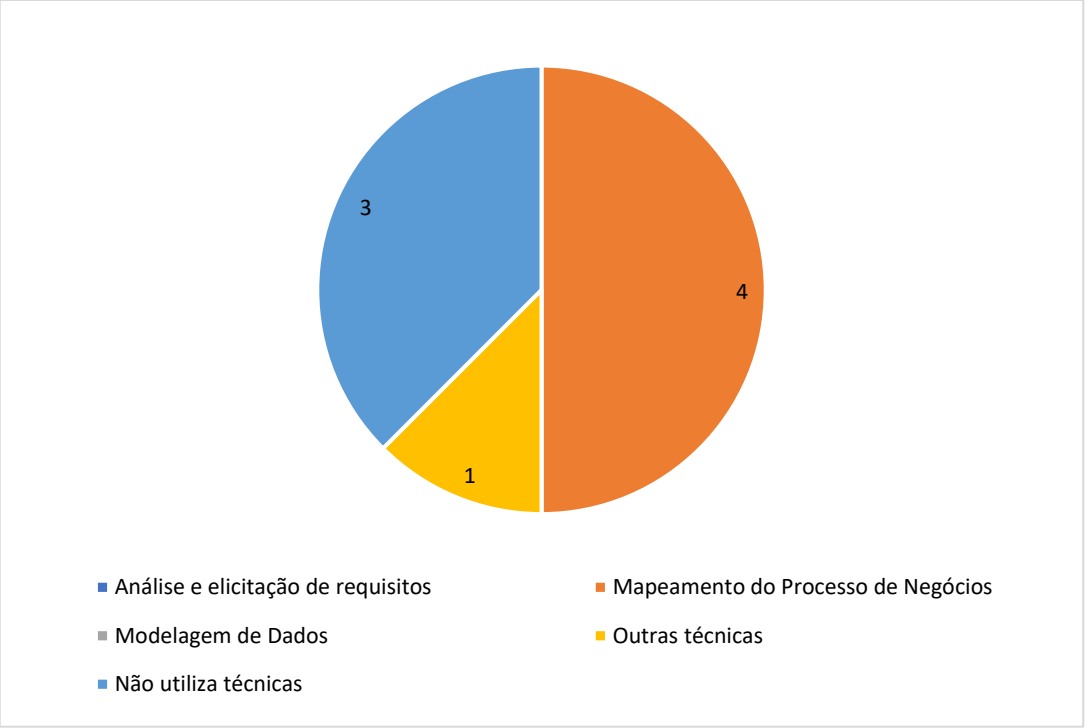
Source: the author, 2023. The graph represents the distribution of the sample of business managers considering the methodologies adopted by them when supervising projects that involve the development of information systems.

It is important to highlight that the “methodologies adopted in business management” are related to the proposed Information Architecture, since they are fundamental to integrate, optimize and align information management practices with the organization's needs and objectives. They play a vital role in ensuring that information is managed strategically contributing to the overall success of the business.

TECHNIQUES THAT ARE ADOPTED TO IDENTIFY THE INFORMATIONAL FLOW

Each interviewee was able to select which techniques were adopted to identify the informational flow, considering the information systems developed or maintained between 2019 and 2021, under their supervision, as business manager.

Graph 2: What techniques are adopted to identify information flow?



Source: the author, 2023. The graph represents the distribution of the sample of business managers considering techniques adopted by them to identify the information flow of their respective systems.

The analysis suggests that while there is some focus on process mapping, there is a lack of adoption of formal requirements analysis and elicitation techniques, as well as data modeling. This may represent an opportunity for the organization to strengthen its management and analysis practices, especially in areas that require a detailed understanding of system requirements and data structure. Adopting more structured approaches can help improve the quality of processes.

Finally, it is important to highlight that the “techniques that are adopted to identify the informational flow” are related to the proposed Information Architecture, since they are vital in determining the course of information in a corporation, focusing on refining the established processes. This method has the ability to automate manual functions, eliminate repetitions and improve operational efficiency.

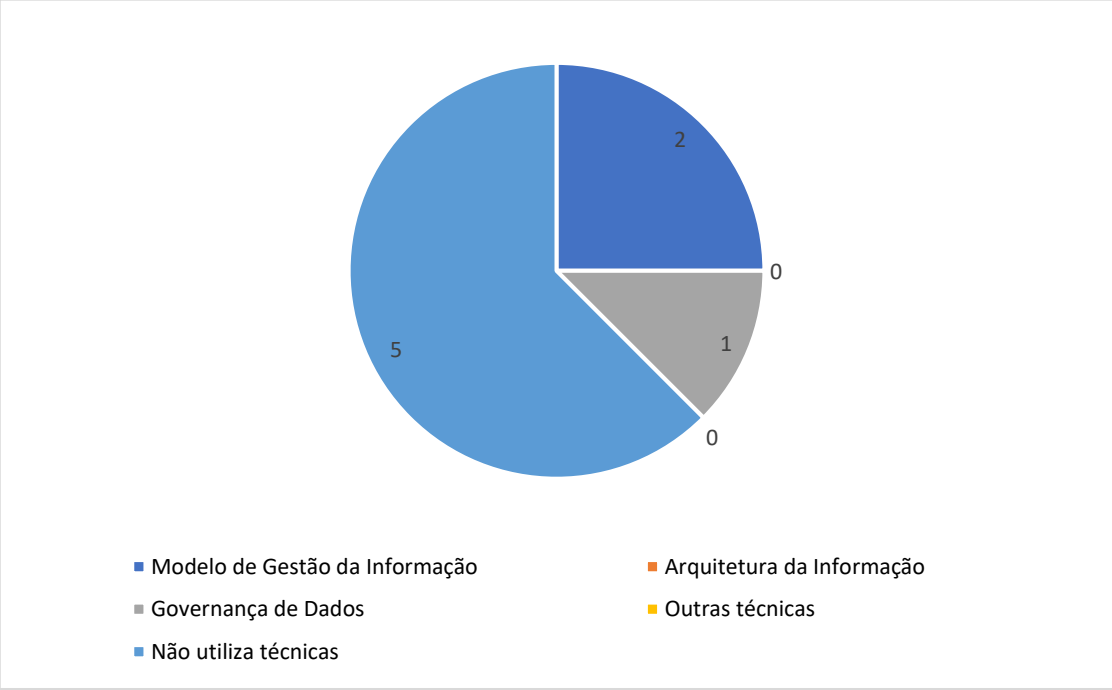
TECHNIQUES THAT ARE ADOPTED TO HANDLE INFORMATION FLOW

Each interviewee was able to select which “techniques were adopted to handle the information flow”, considering the information systems developed or maintained between 2019 and

2021, under their supervision, as business manager. This analysis suggests that the organization has a limited focus on formal information management, with some attention paid to the overall information management model and minimal recognition of the importance of data governance.

The absence of established information architecture practices and the prevalence of situations in which no formal techniques are used indicate potential areas for improvement and development. Integrating more structured and comprehensive approaches to information management could bring significant benefits in terms of efficiency, security and effective use of information.

Graph 3: What techniques are adopted to handle information flow?



Source: the author, 2023. The graph represents the distribution of the sample of business managers considering techniques adopted by them to handle the information flow of their respective systems.

Finally, it is important to highlight that the “techniques that are adopted to handle the informational flow” are related to the proposed Information Architecture, since, in the military environment, the fine balance that determines victory or setbacks often resides in the foundation decisions based on accurate and current information.

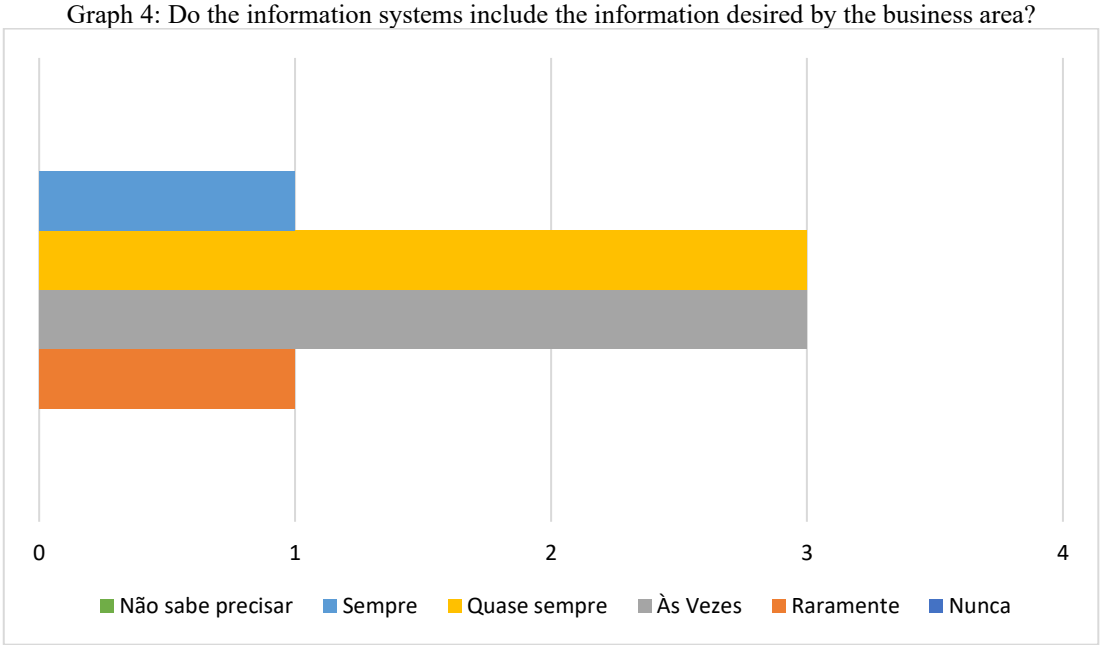
INFORMATION SYSTEMS INCLUDE THE INFORMATION DESIRED BY THE BUSINESS AREA

The scale used in the research provides a way to evaluate the effectiveness with which information systems meet the needs of the EB's business area.

This scale helps to identify the degree of alignment between information systems and the needs of the business area. A rigorous assessment in these terms is crucial to ensure that IT

investments are aligned with the organization's strategic objectives and that information systems are contributing to business success.

Graph 4: Do the information systems include the information desired by the business area?



Source: the author, 2023. The graph represents the distribution of the number of systems between the years 2019 and 2021 by the level of information desired by the business area.

The analysis suggests that, in general, information systems tend to meet the needs of the business area in a variable way, with a tendency to be effective "almost always" or partially effective "sometimes". This indicates a reasonable level of alignment between information systems and business needs, but also points to areas where improvements could be beneficial, especially in achieving consistency in meeting business needs.

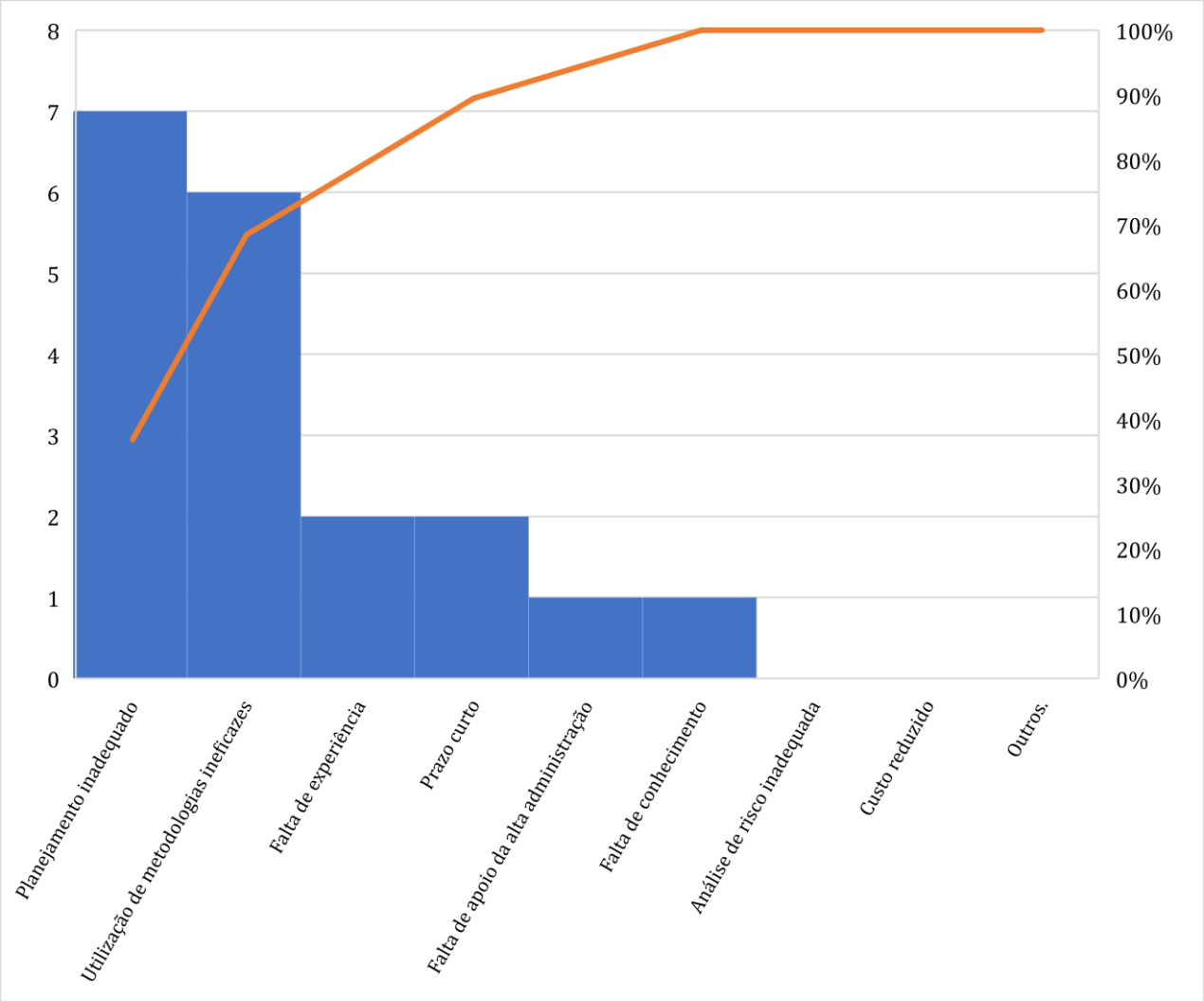
Finally, it is important to highlight that the “information systems that include the information desired by the business area” are related to the proposed Information Architecture, since the adequacy of information systems facilitates the identification of areas for continuous improvement in processes information management, contributing to continuous innovation and operational improvement.

DIFFICULTIES ENCOUNTERED IN BUSINESS MANAGEMENT

The analysis indicates that the biggest challenges identified are inadequate planning and the use of ineffective methodologies or the absence thereof. These are critical aspects that must be addressed to improve business management effectiveness.

While a lack of support from senior management and a lack of business management knowledge are minor problems, they also deserve attention to ensure more efficient and successful business management.

Graph 5: What are the difficulties encountered in business management?



Source: the author, 2023. The graph considers the years 2019 to 2021 and represents the distribution of difficulties encountered in business management.

Finally, it is important to highlight that “difficulties encountered in business management” are related to the proposed Information Architecture, since management problems can prevent the organization from adapting effectively to changes in the market or technological environment, limiting the growth and evolution of the information ecosystem.

FINAL CONSIDERATIONS

Business Management represents the synergy between business strategy and information technology. This component ensures that IT initiatives are in sync with the organization's goals and objectives, promoting strategic alignment and contributing to sustainable competitive advantage.

The Strategic Management Model (Taleby Ahvanooey et al., 2023; dos Santos et al., 2022; McGee & Crowley-Koch, 2021; Da Cruz et al., 2020), emphasizes the integration of information in the design of organizational strategy.

This paradigm advocates that information management must be a dynamic process, which influences and is influenced by the organization's strategy, resulting in an approach that recognizes information as a strategic resource and as an integral part of the strategic planning process.

In turn. Business management, through GPD and PDCA, offers a perspective on how organizational objectives are established, pursued and achieved. The definition of clear responsibilities, the establishment of goals, the deployment of these goals and the creation of action plans are vital elements that guarantee strategic and operational alignment. Continuous monitoring and the ability to make adjustments based on results are fundamental to effective and adaptive management.

GPD focuses on defining clear goals and objectives that guide the organization's activities, ensuring that all efforts are aligned with the organizational vision and mission (Lessard et. al., 2017). This strategic alignment is crucial to ensuring that individual initiatives effectively contribute to the organization's long-term goals.

The PDCA cycle, in turn, offers an operational method to implement these guidelines (Lu et. al., 2022). It starts with the " *Plan* ", where strategies are developed to achieve established guidelines. This is followed by " *Do* " (doing), the strategy execution phase. " *Check* " involves reviewing and analyzing the results obtained in comparison with the expected objectives. Finally, " *Act* " is the stage where adjustments and improvements are made based on feedback, closing the cycle and starting new planning.

The combination of GPD with PDCA creates a dynamic management system that not only directs the organization towards its strategic goals, but also facilitates the adaptation and continuous improvement of processes (de Araújo & Gonçalves, 2011). This integrated management system is ideal for responding to changes in the environment, promoting continuous improvement and sustaining innovation and competitiveness.

Figure 3 illustrates the proposed Information Architecture, that is, how methodologies are used to establish a continuous cycle of planning, execution, evaluation and improvement in an organization's processes and projects. These methodologies, when applied together, promote a systematic and objective-oriented approach that is fundamental to achieving consistent results aligned with EB's strategic guidelines .

Figure 3: Proposed Information Architecture

Source: the author, 2024. The proposed IA encompasses the GPD activities and PDCA steps used in Business Management.

The first activity in the GPD is to define the person responsible (or responsible) for the project. This individual or team will be responsible for leading the effort to achieve the established goals, coordinating activities, mobilizing resources and serving as a point of communication between different stakeholders (Campos, 2013). The appointment of a person responsible ensures that there is *accountability* and a clear focal point for making decisions and actions.

Next, the organization should establish one or more clear and measurable annual goals. These goals must be aligned with the organization's long-term vision and strategy and must be specific, measurable, achievable, relevant and time-bound.

Once the annual goals are determined, they must be broken down into specific objectives for different levels and departments of the organization. This unfolding process ensures that all members of the organization understand how their daily activities and individual projects contribute to global goals. Deployment creates a chain of responsibility and facilitates coordination between different areas.

With the unfolded goals established, the next activity is to develop detailed action plans to achieve them. This involves defining specific tasks, deadlines, responsible parties and necessary resources. The action plan serves as a roadmap for implementation, detailing what needs to be done, by whom, and when, to achieve the defined objectives.

Finally, it is critical to continually monitor progress toward goals and make adjustments as necessary. This may involve collecting and analyzing performance data, holding regular review meetings, and adapting action plans to address emerging challenges or seize new opportunities.

PDCA is divided into four stages, each aimed at ensuring the effectiveness of implemented actions and promoting continuous improvements (Isniah et. al., 2020).

In the planning stage, the focus is to clearly define the objectives to be achieved and develop an action plan to achieve them. What it involves:

1) Identify and analyze the problem or opportunity for improvement.

2) Set specific, measurable, achievable, relevant and time-bound goals.

3) Determine the performance measures or indicators that will be used to evaluate success.

4) Develop a detailed plan that establishes the strategies, activities, resources and deadlines needed to achieve the goals.

The execution stage involves putting the action plan into practice. What it includes:

1) Train and prepare the people involved, ensuring that they have the necessary knowledge and skills to perform their tasks.

2) Implement the activities defined in the action plan.

3) Collect data and evidence that will allow for subsequent performance assessment.

In the verification stage, the results obtained are compared with the established goals to evaluate the success of the implemented actions. What it comprises:

1) Analyze the data and information collected during the execution phase.

2) Evaluate whether the goals were achieved and identify any deviations from expectations.

3) Identify the causes of any problems or deviations so that they can be addressed in the next phase.

The last stage is where corrective or improvement actions are taken based on the analysis of the results. What to cover:

1) Adjust the process or action plan to address any identified issues.

2) Implement changes that aim to improve the process and prevent the recurrence of problems.

3) Standardize and institutionalize successful improvements to ensure benefits are maintained over the long term.

4) Start a new PDCA cycle, if necessary, to seek continuous improvements.

As a future study, it is expected that the integration of Business Management and Information Systems will continue to evolve, further emphasizing the importance of strategic planning. The evolution of GPD and PDCA methodologies must consider the impact of emerging technologies such as artificial intelligence, machine learning and *big data analysis. date* in the decision-making process.

It will be important to investigate how these technologies can improve organizations' ability to predict trends, automate processes, and customize business strategies for different market segments. The study should also explore how organizational culture and innovation capacity can be strengthened by adopting digital tools, resulting in better leveraging of knowledge and resources.

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