

MULTIDISCIPLINARY STUDIES: MANAGEMENT AND LEGAL SCIENCES

Editors

Maria Emilia Camargo

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**GLOBAL
ACADEMY**

**MULTIDISCIPLINARY STUDIES:
MANAGEMENT AND LEGAL
SCIENCES**

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Maria Emilia Camargo

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Preface

Today the world is marked by increasing complexity, where the boundaries between disciplines become increasingly interconnected. Therefore, the dialogue between different areas of knowledge is essential for the understanding and solution of the diverse challenges we face. This book, "Multidisciplinary Studies: Management and Legal Sciences", is born of this understanding, bringing a comprehensive and integrated perspective on important topics that permeate management and law.

Management and the legal sciences, although traditionally seen as distinct fields, share a deep interdependence. Business and administrative decisions are inevitably shaped by regulatory and legal frameworks, as well as legal legislation and practices are influenced by organizational and economic dynamics. This book explores this intersection, highlighting how the collaboration between managers and jurists can generate innovative and effective solutions to contemporary problems.

Throughout the chapters, readers will have the opportunity to discover a diversity of approaches and methodologies that reflect the nature of the topics covered, will find practical cases analyzes and theoretical studies. Each contribution enriches the understanding of how these areas can interact productively.

Thus, in the world where change is a constant, the ability to integrate knowledge and collaborate beyond traditional boundaries becomes a strategic differential. "Multidisciplinary Studies: Management and Legal Sciences" is a valuable contribution to this movement, offering tools and reflections that enable managers and jurists to navigate more effectively and creatively in today's and tomorrow's challenges.

We hope that this work will inspire not only greater understanding between the areas of management and law, but also a more collaborative and innovative professional practice. May it serve as a starting point for new research, debates and, above all, to the practical application of interdisciplinary knowledge that contributes to the common good.

Good reading!

Prof. Dr. Maria Emilia Camargo

June 2024

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BIBLIOMETRIC ANALYSIS OF THE MULTIPOINT JUDICIARY FROM 2019 TO 2023 IN BRAZIL

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Abstract

The term "multi-door judiciary" refers to a judicial system that offers different doors or methods for resolving legal disputes, thus complying with the constitutional precept that advocates the right to swift justice for all Brazilian citizens. Rather than relying exclusively on formal trials, a multi-door judicial system promotes a variety of dispute resolution options, such as negotiation, mediation, conciliation and arbitration. This research aimed to carry out a bibliometric analysis of publications on the Multipoint Judiciary in Brazil, from 2019 to 2023, in order to identify trends, research patterns and the main topics covered. The research is classified as an exploratory and descriptive bibliometric study, with a quantitative approach, carried out from the Google Scholar electronic database, on January 5, 2024, with a time lapse between 2019 and 2023. The quantitative analysis of the articles on the topic researched during the period analyzed reveals a great interest in the academic world in the topic of "Multipoint Courts and Judicial Centers". Between 2019 and 2023, 663 articles were published on this topic. In the same period, 615 articles were published on "Mediation, Conciliation and Arbitration". When looking specifically at the topic of "Multipoint Judiciary", 11 articles were published.

Keywords: Technological Waste; Environment; Society; Consumption; Disposal.

1. Introduction

This research aimed to carry out a bibliometric analysis of publications on the Multipoint Judiciary in Brazil, from 2019 to 2023, in order to identify trends, research patterns and the main topics covered.

The Multipoint Judiciary represents an innovative approach to the justice system, offering multiple avenues for resolving conflicts, such as mediation, conciliation and arbitration, in addition to traditional court proceedings. This study aims to quantify and analyze academic and scientific production on this specific topic, identifying trends, publication patterns, and the evolution of interest and theoretical and practical development in the field. Through the quantitative analysis of articles, theses and other relevant publications, we seek to better understand the dissemination of knowledge about the Multipoint Judiciary and its impact on the efficiency and effectiveness of the Brazilian judicial system.

The resolution of conflicts in complex and dynamic societies presents a constant challenge for the judicial system, which must develop innovative and effective approaches to meet this challenge. In the contemporary context, the implementation of alternatives to the traditional judicial route has gained prominence, with the approach known as Multipoint

Judiciary reflecting a paradigm shift that recognizes the need to diversify dispute resolution methods. This approach seeks not only to pacify disputes but also to promote efficiency and accessible justice (Mancuso, 2010).

In this manner, the Multi-door Judiciary emerges as a response to this challenge, promoting the idea of multiple avenues of access to justice, each designed to meet the needs of the parties involved in a specific and appropriate way. Within this context, conciliation and mediation have emerged as valuable tools to promote the peaceful resolution of disputes, offering a more agile and participatory approach, capable of preserving interpersonal relationships and relieving the judicial system (Cabral, 2024).

The Brazilian Constitution guarantees the right to justice, which is one of the fundamental principles of the Democratic State of Law. This right ensures that all citizens have access to justice, equality before the law, due process of law, adversarial proceedings, and full defense, among other fundamental rights (Ross, 2022).

The 1988 Federal Constitution enshrines the right to justice in various provisions, including Article 5, which guarantees all citizens the right to equality before the law, without distinction of any kind, and access to the Judiciary to defend their rights. Furthermore, the Constitution provides for the guarantee of due process of law, adversarial proceedings and ample defense in all judicial spheres.

In this manner, the Brazilian constitution acknowledges the significance of the right to justice in guaranteeing fundamental rights and promoting equality and social justice in society. In 2010, the National Council of Justice (CNJ) issued Resolution 125, which delineates the parameters and regulations for the National Judicial Policy regarding the appropriate handling of conflicts of interest within the scope of the Judiciary. The resolution's objective is to promote the use of conciliation and mediation as effective means of preventing and resolving disputes, thereby ensuring the speed and efficiency of justice. (Cruz; Nunes, 2024).

The primary objectives of CNJ Resolution 125 include the establishment and organization of Judicial Centers for Conflict Resolution and Citizenship (CEJUSCs), the training of judges and civil servants in the techniques of conciliation and mediation, and the implementation of campaigns designed to foster a culture of conciliation. The resolution's overarching goal is to cultivate a culture of social pacification and to reduce the number of lawsuits, thereby contributing to the de-judicialization of conflicts and to the effective access to justice (Mendes, 2020).

By focusing on the issue of multiple doors in the judiciary, it is important to understand the growing importance of conciliation and mediation in resolving disputes. The proposal to provide alternative methods of conflict resolution not only highlights the need to lighten the load on the judicial system, but also underscores the search for a more accessible, efficient justice system centered on the needs of the parties involved. The rationale for investigating conciliation and mediation as pivotal tools in this context is rooted in the pursuit of a more humane and collaborative approach, capable of meeting the contemporary demands for expeditious and less adversarial justice. (Silva; Spengler, 2013; Tartuce; Gabbay; Faleck, 2014)

The concept of multiport refers to the utilization of diverse conflict resolution mechanisms, including mediation, arbitration, and the courts, to resolve legal disputes. This approach aims to enhance flexibility and efficiency in dispute resolution, enabling the parties to select the most suitable means to resolve their controversies (Cabral, 2024; Oliveira, 2023).

Conciliation, mediation and arbitration are three alternative dispute resolution methods used to resolve disputes without the need to resort to the traditional judicial system.

Conciliation is a process in which an impartial third party, known as a conciliator, helps the parties involved to reach a mutually satisfactory agreement. The conciliator has no decision-making power and only facilitates communication between the parties, encouraging negotiation and mutual understanding (da Silva, 2010).

Mediation is a process similar to conciliation, in which an impartial third party, known as a mediator, helps the parties reach an agreement. However, the mediator plays a more active role in resolving the conflict, providing suggestions and proposals to help the parties find a solution (Tartuce; Brandão, 2020).

Arbitration is a process in which the parties involved agree to submit the dispute to an arbitrator, who acts as a private judge and has the power to make a binding decision for the parties involved. Arbitration is generally faster and less formal than traditional court proceedings, and the arbitrator's decisions are usually final and cannot be challenged in court.

In short, conciliation, mediation and arbitration are alternative methods of conflict resolution that can be used voluntarily by the parties involved to resolve disputes quickly, effectively and less expensively than the traditional judicial route (Machado; Catarino; Sobral, 2023).

The effectiveness of the multi-door justice system refers to the system's ability to provide effective forms of dispute resolution for individuals involved in litigation. By offering various dispute resolution options, such as negotiation, mediation, arbitration and court trial, a multi-door justice system can increase efficiency and effectiveness in resolving disputes.

In addition, a multiport judicial system can help reduce the caseload in courts, speed up dispute resolution, lower costs and promote a more collaborative and participatory environment in conflict resolution (Fux, Ávila, Cabral, 2021).

The effectiveness of a multi-door judicial system can be measured by its success in resolving disputes efficiently and fairly, by the satisfaction of the parties involved, and by the promotion of a culture of peaceful and effective conflict resolution. In addition, it is important to consider the accessibility of the system for all parties, regardless of their economic or social situation. The system's ability to reduce the time and costs associated with conflict resolution is also a crucial indicator of its effectiveness. Another relevant aspect is the diversity and suitability of the methods offered to resolve different types of disputes, ensuring that each case can be dealt with in the most appropriate way. The transparency and impartiality of the decisions made are also fundamental to maintaining public confidence in the system. Ultimately, a successful multi-door judicial system contributes to social cohesion and stability by promoting alternative methods of conflict resolution that complement the traditional judicial process.

2. Methodology

Descriptive research, according to Triviños (1987), is characterized as a detailed study of the research object and the related facts and phenomena. Triviños (1987) states that descriptive research requires a series of information about the objective to be investigated. In this context, Chechi (2016) points out that the methodology should be built considering elements such as a clear and objective description of the different stages of the methodological path, contributing to an understanding of the search strategies used in the study.

This bibliometric research followed the sequence of methodological procedures established in previous studies, such as those by Silva (2016), Minetto (2016), Schirmann (2016) and Mello (2017).

These methodological procedures are defined as "the steps necessary to answer the research problem and meet the objectives proposed in the study" (Chechi, 2016).

The next stages of this research, including the design of the search strategy, will be presented below.

The search was carried out on Google Scholar, which is a powerful and accessible tool that facilitates access to global academic literature, including scientific journal articles, theses, books, abstracts, technical reports and other scientific publications from various disciplines and languages, thus promoting the dissemination and advancement of scientific knowledge

The use of Google Scholar is justified by the fact that it contains all the publications in the Capes Journals database. In addition, Google Scholar has stood out as one of the main scientific search tools (Falagas et al., 2008), since its results are as good as those of other scientific research databases Harzing e Alakangas (2016).

The search was carried out on Google Scholar, which is a powerful and accessible tool that facilitates access to global academic literature, including scientific journal articles, theses, books, abstracts, technical reports and other scientific publications from various disciplines and languages, thus promoting the dissemination and advancement of scientific knowledge

The following keywords were used as a search strategy: "Multiport Judiciary", "Mediation in the Judicial System", "Conciliation in the Judicial System", "Arbitration in the Judicial S", "Multiport Court, Judicial Centers", "Mediation, Conciliation, Arbitration".

Thus, this study is characterized as an exploratory and descriptive bibliometric study, with a quantitative approach, carried out from the Google Scholar electronic database, on January 5, 2024, with a time lapse between 2019 and 2023.

3. Results and Discussion

The results are shown in Table 1, covering the search with the keywords: "Multiport Judiciary", "Mediation in the Judiciary System", "Conciliation in the Judiciary System", "Arbitration in the Judiciary System", "Multiport Court and Judiciary Centers" and "Mediation, Conciliation, Arbitration" from 2019 to 2023.

Table 1 - Distribution of the number of articles by keywords from 2019 to 2023

Keywords	2019	2020	2021	2022	2023	TOTAL
"Multiport Judiciary"	2	1	3	4	1	11
"Mediation in the Judicial System"	4	1	0	1	3	9
"Conciliation in the Judicial System"	1	1	1	0	1	4
"Arbitration in the Judicial System"			1			1
"Multiport Court and Judicial Centers"	81	11 5	143	15 5	12 1	615
"Mediation, Conciliation, Arbitration"	14 0	12 4	146	13 3	12 0	663

Source: Authors (2024)

The quantitative analysis of the articles on the topic researched during the period analyzed reveals a great interest in the academic world in the topic of "Multiport Courts and Judicial Centers". Between 2019 and 2023, 663 articles were published on this topic. In the same period, 615 articles were published on "Mediation, Conciliation and Arbitration". When looking specifically at the topic of "Multiport Judiciary", 11 articles were published

4.1 Multiport Judiciary trends in Brazil

Based on the analysis of the articles analyzed, the following trends on Multiport in Brazil can be detected:

1. **Mediation and Conciliation:** An important trend is the emphasis on mediation and conciliation as alternatives to traditional methods of conflict resolution. Studies analyze the effectiveness, advantages and challenges of these methods within the Multiport judicial system.
2. **Implementation and Practice:** Research focuses on the practical implementation of the Multiport Judiciary, including case studies of specific courts, operational challenges, and good practices that can be replicated in other regions.
3. **Impact on Procedural Speed:** Many studies examine how the use of alternative dispute resolution methods affects the speed at which court cases are resolved, looking for evidence of a reduction in processing time and case backlogs.
4. **Accessibility and Inclusion:** There is a growing trend to investigate how the Multiport Judiciary contributes to accessibility to justice, especially for vulnerable populations. This includes studies on democratizing access to alternative methods of conflict resolution.
5. **User satisfaction:** Surveys assess the satisfaction of users of the Multiport Judiciary system, both litigants and legal professionals, to better understand the perception and acceptance of these alternative methods.
6. **Public Policies and Legislative Reforms:** Studies analyze the impact of public policies and legislative reforms related to the Multiport Judiciary, evaluating how changes in legislation influence the adoption and effectiveness of alternative methods of conflict resolution.
7. **Technology and Innovation:** The incorporation of technology, such as online platforms for mediation and conciliation, is another significant trend. Research explores how technology can improve the efficiency and accessibility of the multi-door judiciary.
8. **Education and Training:** There is growing interest in how the education and training of legal professionals influences the effectiveness of the Multiport Judiciary. Studies investigate training programs and academic curricula focused on alternative methods of conflict resolution.

These trends reflect a dynamic and evolving field, with a growing focus on efficiency, accessibility and innovation in the Brazilian judicial system

4.2 Research patterns on the multi-door judiciary in Brazil

The main research patterns found in the bibliometric review articles from 2019 to 2023 on the Multiport Judiciary in Brazil were:

1. **Qualitative Analysis:** Many studies use qualitative methods, such as interviews, focus groups and case studies, to understand the perceptions of those involved and the local particularities of the implementation of the Multiport Judiciary.
2. **Quantitative Analysis:** Quantitative: Statistical analyses are often used to evaluate data on the effectiveness, efficiency and impact of alternative methods of conflict resolution.
3. **Literature Review:** Systematic and narrative literature reviews are common to map the current state of research, identify gaps and establish a solid theoretical basis for new studies.
4. **Case Studies:** Focus on specific courts or pilot programs to analyze the practical implementation and results of the Multiport Judiciary, offering detailed and contextualized insights.
5. **Documentary Research:** Analysis of legal documents, court decisions, legislation and public policies to understand the evolution and regulatory framework of the Multiport Judiciary in Brazil.
6. **Technology and Innovation:** Research focused on the use of digital technologies to mediate conflicts, analyzing online mediation and conciliation platforms, and the impact of these technologies on the efficiency and accessibility of justice.

These research standards reflect a comprehensive and diverse approach, combining qualitative and quantitative methodologies to explore the effectiveness, challenges and opportunities of the multi-door judiciary in Brazil.

4.3 Main themes addressed in research on the Multiport Judiciary

The main themes addressed in research on the Multiport Judiciary in Brazil during the period analyzed reflect a wide range of academic and practical interests, all focused on understanding and improving the justice system. We can highlight some of the themes that have been identified:

1. **Effectiveness of Alternative Methods of Conflict Resolution (MARC)**
 - Studies on the effectiveness of mediation, conciliation and arbitration in resolving conflicts compared to traditional judicial methods.
 - Analysis of success rates, resolution times and participant satisfaction.
2. **Impact on decongesting the judiciary**
 - Research examining how the Multiport Judiciary contributes to reducing the backlog of cases in the courts.
 - Studies on procedural speed and improving judicial efficiency.
3. **Accessibility and Inclusion**

- Research into how alternative methods of conflict resolution increase access to justice for vulnerable and marginalized populations.

- Issues of equity and social justice in the context of the Multiport Judiciary.

4. Public Policies and Legislation

- Analysis of the impact of public policies and legislative reforms that promote the use of alternative methods of conflict resolution.

- Studies on the implementation and effectiveness of specific laws and regulations

5. User Perception and Satisfaction

- Surveys on the perception of litigants, lawyers, judges and mediators regarding the effectiveness and efficiency of alternative methods.

- Evaluations of user and professional satisfaction with the process and the results obtained.

6. Training and Capacity Building

- Topics related to the training and qualification of mediators, conciliators and other professionals involved in the Multiport Judiciary.

- Studies on the inclusion of alternative methods of conflict resolution in law school curricula and ongoing training programs.

7. Technology and Innovation

- Investigations into the use of digital technologies to mediate and conciliate conflicts, such as online platforms and communication tools.

- Studies on the impact of technology on the efficiency, accessibility and quality of conflict resolutions.

8. Comparative Analysis

- Comparisons between different states and regions of Brazil or between Brazil and other countries to identify best practices and common challenges.

- Studies on variations in the implementation and results of the Multiport Judiciary.

9. Culture and Organizational Change

- Issues related to the cultural change needed in the courts and among legal professionals to effectively adopt the Multiport Judiciary.

- Studies on resistance to change and strategies to promote acceptance of alternative methods.

10. Economics and Sustainability

- Economic analyses of the cost-benefit of alternative methods of conflict resolution.

- Studies on the long-term sustainability of the Multiport Judiciary and its financial impact on the judicial system.

These themes demonstrate a multifaceted approach to studying the Multiport Judiciary in Brazil, ranging from practical implementation issues to broader social and economic impacts.

4.4 Main areas of research highlighted in the articles researched

The main areas of research on the Multiport Judiciary include:

1. Models and operating structures

- Analysis of the different models of multi-door courts and how they are implemented in different jurisdictions.
- Organizational and operational structures that facilitate the coexistence of multiple dispute resolution methods within the judicial system.

2. Efficiency and Effectiveness

- Evaluation of the efficiency of multi-door courts in resolving disputes compared to traditional methods.
- Case studies on the effectiveness of alternative dispute resolution (ADR) methods such as mediation, conciliation and arbitration within the courts.

3. Impact on Judicial Workload

- Research into how the implementation of multi-door courts affects judges' workload and the length of court cases.
- Analysis of how multi-door courts contribute to reducing judicial delays and case backlogs.

4. User Satisfaction

- Surveys on the satisfaction of litigants and lawyers with the dispute resolution methods offered by multi-door courts.
- Qualitative studies on users' experiences and perceptions of justice and fairness in proceedings.

5. Integration with Other Dispute Resolution Systems

- Studies on the integration of multiport courts with other dispute resolution systems and services outside the judiciary.
- Analysis of collaboration between multiport courts and private or community entities offering ADR services.

6. Challenges and Barriers to Implementation

- Identification of the main challenges and barriers to the effective implementation of multiport courts.
- Research into cultural and institutional resistance to the adoption of alternative dispute resolution methods.

7. Training and Capacity Building:

- Studies on the training and capacity building of judges, mediators, conciliators and other professionals involved in multiport courts.
- Development of specific curricula and training programs to support practice in multi-door courts.

8. Public policies and legislation:

Analysis of the public policies and legal frameworks that underpin the creation and operation of multiport courts.

Comparisons between national and international legislation regulating multiport courts.

9. Social Impact and Access to Justice:

Research on the impact of multiport courts on access to justice, especially for vulnerable populations.

Studies on how multiport courts can contribute to a more inclusive and equitable justice system.

10. Technological Innovations:

- Research into the use of digital technologies and platforms to support the operation of multi-door courts.

- Evaluation of the impact of technological innovations on the efficiency and accessibility of dispute resolution methods.

These areas reflect the wide range of issues and challenges facing multi-door courts and provide a solid basis for future research and development in this field.

Final Considerations

The aim of this bibliometric article on the application of the multi-door model in the judicial system was to analyze academic studies and research related to the topic. Through the literature review, it was possible to identify a growing interest in implementing alternative conflict resolution mechanisms in the legal sphere, with the aim of relieving the judicial system and providing a more efficient and satisfactory resolution for the parties involved. It is clear that the subject is of great interest and repercussion for society, which seeks to have its conflicts resolved quickly and fairly, thus complying with constitutional precepts.

The results highlight the importance of the multi-door model as a viable alternative for resolving disputes, offering the parties involved a range of options that go beyond the traditional judicial route. Among the main benefits pointed out are speed, confidentiality, savings in resources and the possibility of preserving relationships between the parties.

However, despite the progress made and the growing adoption of the multi-door model, there are still challenges to be faced, such as the lack of knowledge and awareness of the existing alternatives, as well as cultural and institutional resistance to its implementation.

In light of the above, we can conclude that the multi-door model is an important tool for modernizing and improving the judicial system, contributing to greater efficiency and effectiveness in resolving conflicts. However, a joint effort by the various players involved is needed if these alternatives are to be widely adopted and their benefits fully exploited.

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OVERVIEW OF PATENT APPLICATIONS AFTER THE DECLARATION OF UNCONSTITUTIONALITY OF THE MINIMUM VALIDITY PERIOD

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Abstract

This is a study that analyzes the situation of the validity of patents filed with the Brazilian Patent and Trademark Office (BPTO) after the new system of validity resulting from the decision of unconstitutionality of article 40, sole paragraph, of law 9279/1996, the so-called rule of minimum term. When it comes to pharmaceutical products, this minimum term is no longer valid also for patents already granted before the decision. Thus, this study aims to draw a situational panorama of patents granted and to be granted impacted by the decision. With the advent of this decision, the term of validity of patents will be 20 (twenty) years, with no possibility of extension due to the delay in the decision to grant. For this purpose, the research methodology of documentary analysis was adopted at the BPTO's database. It was found that between 2010 and May 2021, on average, 52.35% of the patents were granted observing the minimum term, and, of the total of pending applications, 5.04% should still observe this term if granted after 12/31/2021.

Keywords: Patents; Minimum Term; Unconstitutionality.

1 Introduction

This paper addresses the situation of patents granted, and to be granted, by the National Institute of Industrial Property (INPI) after the advent of the decision that declared the unconstitutionality of the minimum term rule contained in article 40, sole paragraph, of law no. 9.276/1996, the Industrial Property Law (LPI). With this decision by the Federal Supreme Court (STF), patents are now valid for a maximum of 20 years for inventions and 15 years for utility models, counted from the date of filing, and it is no longer allowed to observe the minimum period of 10 and 7 years after the grant. The objective, then, is to trace an overview of the granted patents and the pending ones, impacted by the decision.

To this end, the study adopts qualitative research with documentary methodological procedure in which it describes and analyzes the patent applications granted by the PTO, and

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to be granted, between the years 2010 and May 2021, with a survey of patents in the PTO Portal conducted in January 2022 (Lakatos & Marconi, 2019; Gil, 2010; Gibbs, 2009; FLICK, 2009; Creswell, 2007). It is adopted, as a complement, bibliographic research in scientific articles, books, and other publications capable of providing elements to understand the state of the art of patents, in addition to analyzing the international, constitutional, and infra-constitutional norms that deal with the subject, as well as the recent judgment of the STF that addressed the issue. This is a subject of social and academic relevance, since studies indicate that the scientific production involving patents is gradually increasing in the last two decades (Kalip, Erzurumlu & Gün, 2022).

The extended term of patents impacted most of the INPI's concessions, 52.35%, which in the health area alone represents R\$ 3.9 billion spent from the Brazilian budget (Paranhos, Mercadante & Hasenclever, 2020). INPI data (2021) also show that the extended term of patent grants is less than 2 years beyond the ordinary term, with only 78 patents exceeding the ordinary term by 10 or 7 years. After this decision, the pending patent applications still to be reached by the minimum term represent only 5.04% of a total of 137,781 applications. In addition to this introduction, the article is structured in four chapters. The second deals with the theoretical framework, the third with the methodology, the fourth with results and discussions, followed by the conclusions and references at the end.

2 Theoretical Framework

Patents are part of an Intellectual Property System (SPI) that comprises a genus with several species and subspecies, being the patents of invention and utility model species of Industrial Property (Table 1). Brazil enacted Law No. 9,276/1996 to regulate the rights and obligations relating to the protection of industrial property by granting patents of invention.

Table 1. Intellectual Property System (SPI)

Industrial Property		Copyright	Sui Generis Protection
Patent	Invention	Copyright	Integrated Circuit Topography
	Utility Model		
Registration	Trademarks	Neighboring Rights	Cultivars
	Industrial Design		
Geographical Indication	Indication of Source	Computer Program	Traditional Knowledge
	Denomination of Origin		
Industrial Secrecy and Reprehension of Unfair Competition			

Source: Araújo *et. al.* (2010), Herscovici (2007), Matias-Pereira (2011) and Coelho (2016)

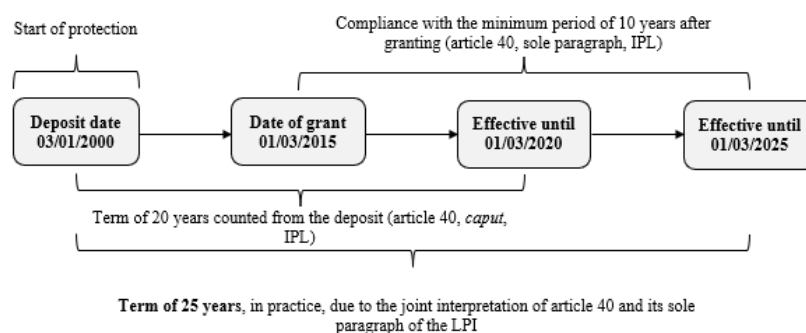
The patent can be, according to the LPI, of invention or utility model (Adriano & Antunes, 2017). Patent is a right legally granted by the State to the inventors of certain products, manufacturing processes or improvement that guarantees the exclusive economic exploitation for a certain period (Matias-Pereira, 2011), it is therefore a title granted by the State to confer protection and exploitation exclusivity to the holder of an invention (Labrunie, 2006). Cerqueira (1982) clearly synthesizes the existence of three theories to define the legal nature of the patent, they are: intellectual creations are species of personal rights; proposes a new category of rights, the intellectual rights; and treats as immaterial assets. LPI adopted the second theory, i.e., patents for inventions constitute a new category of right, the intellectual rights (Brasil, 1996).

Table 2. Patent classifications by technological area

Coordination	Technological Area
CGPAT I	Pharmaceuticals. Inorganic chemistry. Textiles. Polymers.
CGPAT II	Food and Plants. Biochemistry. Agriculture and Engineering. Molecular Biology. Pesticides and Agrochemicals
CGPAT III	Signal Processing. Digital and Optical Networks. Broadcasting Systems, Antennas and Electromagnetic Waves. Telephony. Chemical Engineering. Applied Physics, Materials and Measurements. Geophysics. Optics. Electrical Engineering Civil Engineering, Mechanical Engineering, or Architecture Computers and Electronics Biomedical Engineering Electronics and Signal Processing
CGPAT IV	Metallurgy and Materials Mechanical Engineering - Machine Tools Mechanical Engineering. Chemical Engineering. Human Needs. Packaging. Mechanical Engineering. Technology applied to the Environment.

Source: WIPO (2018) and INPI (2017)

For an invention or utility model to be patentable, some requirements must be met (Adriano & Antunes, 2017). Three are the requirements for patentability of inventions, novelty, inventive activity, and industrial application (Brasil, 1996). The novelty is related to the invention is not comprised in the state of the art, the inventive activity is non-obviousness, i.e., it should not be obvious to a technician in the subject and the industrial application is the insertion of the product or process in industrial school production (Araújo et al., 2010). The invention patent also relates to its utility, that is, for an invention to be patentable it is necessary that it presents a practical and commercial utility (Herscovici, 2007). Added to these requirements is that of non-impedance or licitude, situations in which the law prohibits, for technical reasons or to meet the public interest, the patentability of certain inventions (Coelho, 2016; Negrão, 2020). Patents are grouped according to an international classification (Table 1). It is important to protect health-related product inventions, for example, to ensure exploitation by developers (Basso, 2008). However, studies show that this protection cannot be infinite because the end of the term almost always leads to the development of similar products (Scheinberg et al., 2018). The LPI, when enacted, established in article 40, *caput*, the maximum and minimum term of validity of patents. For patents of invention the term would be a maximum of 20 years and a minimum of 10 years, and for utility model patents it would be 15 and 7 years, respectively (Brasil, 1996). By this device, the validity of patents could be extended beyond 20 or 15 years (Figure 1).

Figure 1. Validity of invention patents according to the minimum term rule

Source: Law No 9,276/1996

However, in mid 2021 the STF ruled unconstitutional the rule contained in the sole paragraph of article 40, LPI, which established the possibility of a patent being valid for more

than 20 or 15 years, in cases of sluggishness of the agency responsible for granting the patent, the Brazilian federal autarchy INPI.

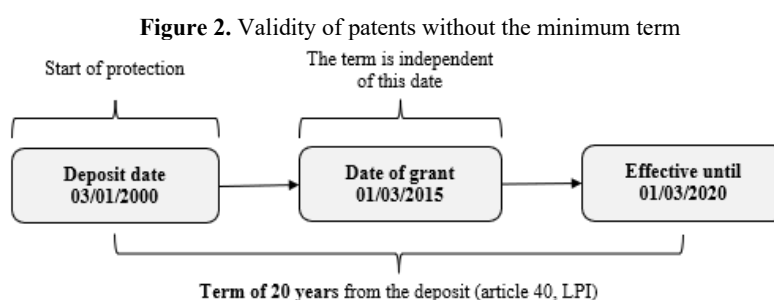
SUMMARY: Direct action of unconstitutionality. Sole paragraph of article 40 of Law No 9,276/1996. Industrial Property Law. Extension of the term of effectiveness of patents in the hypothesis of administrative delay for the appreciation of the request. Indetermination of the term of exclusive exploitation of the invention. **Offense to the legal security, to the patent temporality, to the social function of the intellectual property, to the reasonable duration of the process, to the efficiency of the public administration, to the free competition, to the consumer's defense and to the right to health. Granting of the request. Modulation of the effects of the decision (...)**

6. The sole paragraph of article 40 is unreasonable under several aspects, since it makes the term of effectiveness of patents indeterminate (...)

17. Direct action granted, declaring the unconstitutionality of the sole paragraph of article 40 of Law No 9,276/1996.

18. Modulation of the effects of the decision, granting ex nunc effects, as of the publication of the minutes of this judgment, in order to maintain the term extensions granted based on the legal provision, thus preserving the validity of the patents already granted and still in effect as a result of the application of the mentioned provision. Excluded from the modulation are (i) lawsuits filed until April 7, 2021 (the date of the partial granting of the injunction in this case) and (ii) patents that have been granted with a term extension related to pharmaceutical products and processes, as well as health equipment and/or materials. The ex tunc effect applies to both situations, which will result in the loss of the term extensions granted on the basis of the sole paragraph of article 40 of LPI, and the patent terms established in the *caput* of article 40 of Law 9,276/1996 must be respected, safeguarding any concrete effects already produced as a result of the term extension of said patents. (our emphasis) (STF, 2021).

The STF decision has retroactive validity, *ex tunc*, for the cases of patents that have been granted observing the minimum term related to pharmaceutical products and processes, as well as equipment or materials for use in health, for the other patents it will only be valid as of the decision, i.e., 05/12/2021 (STF, 2021). The STF also emphasized that the minimum term rule does not contribute to solving the chronic backlog of cases submitted to the BPTO. With this decision, the dynamics of patent validity now does not admit the minimum term rule (Figure 2).



Source: Law No 9,276/1996 and STF (2021)

Subsequently, in line with the STF's decision, the Brazilian parliament passed law no. 14,195/2021 revoking the single paragraph of article 40, LPI, already mentioned. Thus, the validity period of invention patents in Brazil must be analyzed according to two periods (Mascarenhas Neto, Camargo & Bizotto, 2022).

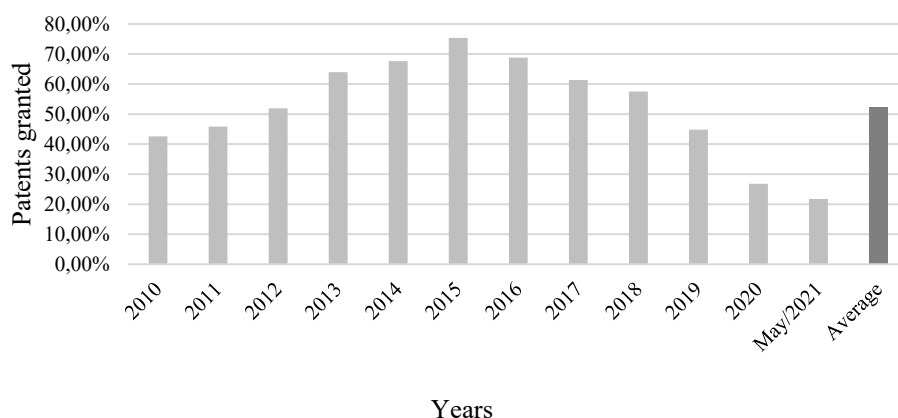
3 Methodological Procedure

This study as to the form of approach can be classified as qualitative research (Gil, 2010; Gibbs, 2009; Flick, 2009; Creswell, 2007). And regarding the technical procedures, it is characterized as documentary research because it describes and analyzes the patent applications granted by the INPI, and to be granted, between the years 2020 and May 2021 (Lakatos & Marconi, 2019). Also, about technical procedures, it can be classified as bibliographic because scientific articles, books, and other publications capable of providing elements to understand the state of the art of patents were used, in addition to analyzing the international, constitutional, and infra-constitutional norms that deal with the topic, as well as the recent judgment of the STF that addressed the subject. The survey of patents was developed in the INPI Portal, carried out in the month of January 2022.

4 Results and Discussions

From the literature review, the norms, and the decision of the Brazilian Charter, it can be concluded that there is no obligation to grant a minimum term for patents as of 05/12/2021. When it comes to patents for pharmaceutical products and processes, as well as equipment or materials for health use, the minimum terms already granted should be annulled. The result is that patents can only last for 20 years if they are inventions, and 15 years if they are utility models. Data from the BPTO show that 80% (9,851) of the decisions handed down from August to October 2021 were filed until the year 2016, which shows the slowness of the Institute.

Figure 3. Patents granted with minimum term

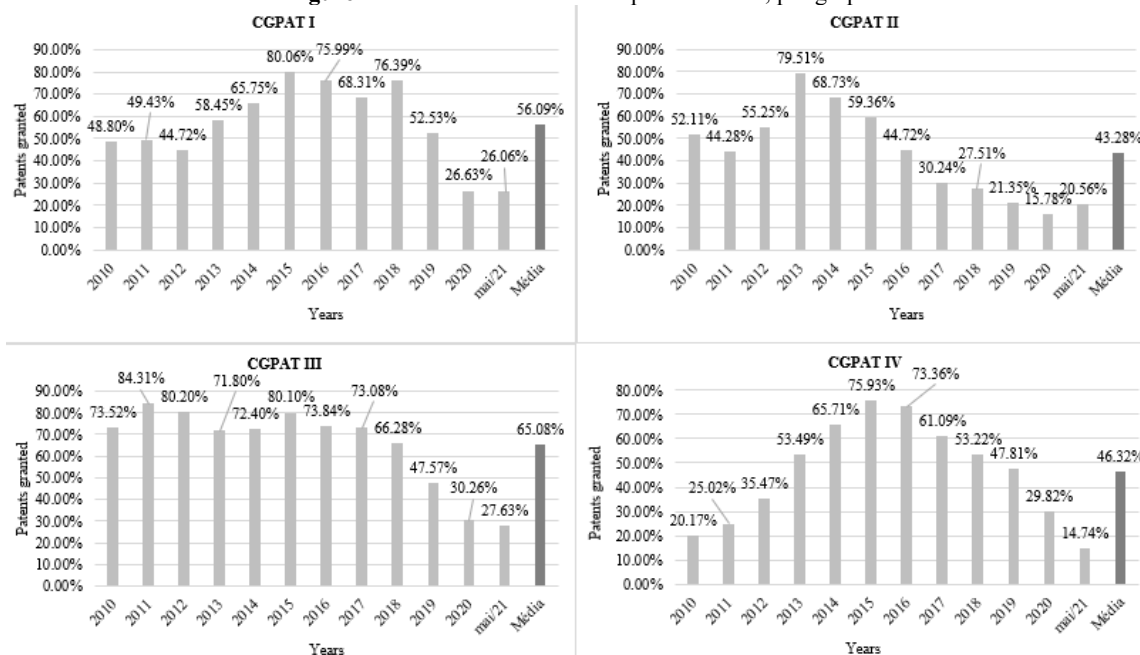


Source: INPI (2021)

The patents for inventions and utility models granted according to the minimum term total 44,155, of which 31,132 are in force (INPI, 2021). Between 2010 and May 2021, on average, 52.35% of patents were granted within the minimum term, with an increasing curve in the first six years, peaking in 2015 (75.35%), and a decreasing curve in the remaining six years

(Figure 3). These data show that more than half of the granted patents had their term extended due to the INPI's slowness, which represents more time of use and economic exploitation with exclusivity, which represents for Brazil, when considering only the expenses with pharmaceutical products, an expenditure of R\$ 3.9 billion in product purchases (Paranhos, Mercadante & Hasenclever, 2020).

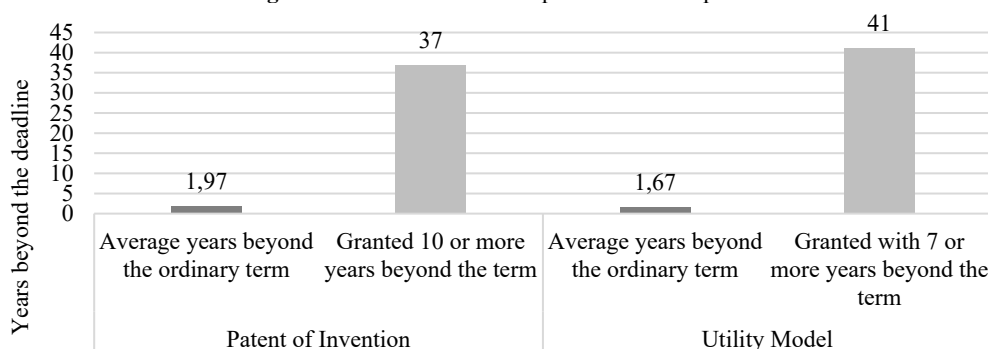
Figure 4. Patentes concedidas com prazo mínimo, por grupo



Source: INPI (2021)

These granted patents, considering the CGPAT I patent group (WIPO, 2017), the curve is like the curve of patents in general (Figure 4). The average number of CGPAT I group patents granted observing the minimum term is 56.06%, more than half, therefore. The month with the highest rate was 2015 (Figure 4). When it comes to pharmaceutical products only, between 1997 and 2018, 92% of the patents granted were with a term, on average, of 3 years of extension (Mercadante & Paranhos, 2022).

Figure 5. Patentes concedidas por ano além do prazo



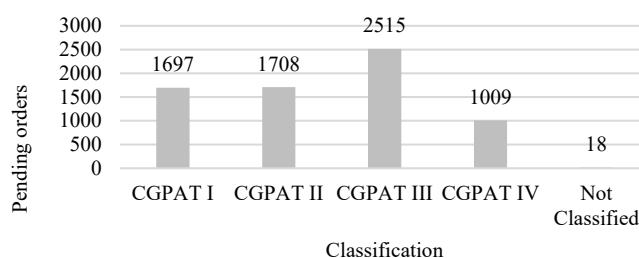
Patents granted
Source: INPI (2021)

When it comes to the CGPAT II classification (WIPO, 2017), a curve slightly different from the others can be noticed (Figure 4). In the CGPAT III (WIPO, 2017) classification group, 65.08% of the patents granted by INPI were with extended term, it is the highest index, it is above the overall average and the average of the other groups (Figure 4). CGPAT IV (WIPO, 2017) has the lowest rate of patents granted with extended term, on average, 46.32% (Figure 4). When the analysis proposes to compare the averages of each patent classification group and the overall average, one has that, in comparison with the overall average (52.35%), two groups - CGPAT I (56.09%) and CGPAT III (65.08%) - are above and two below - CGPAT II (43.28%) and CGPAT IV (46.32%) (Figure 4).

Of the patents granted beyond the maximum term, more than 20 years for inventions and 15 years for utility models, only 37 of them were granted for 10 or more years beyond the maximum term, for inventions, with an average term exceeding the maximum term by 1.97 years. Considering the utility model patents, 41 of them were granted for 7 years or more, with an average of 1.67 years more than the maximum term of 15 years (Figure 5). This shows that, for the most part, the term of the patents exceeds the maximum term by less than 2 years, therefore, very few patents exceeded 10 or 7 years of the maximum term.

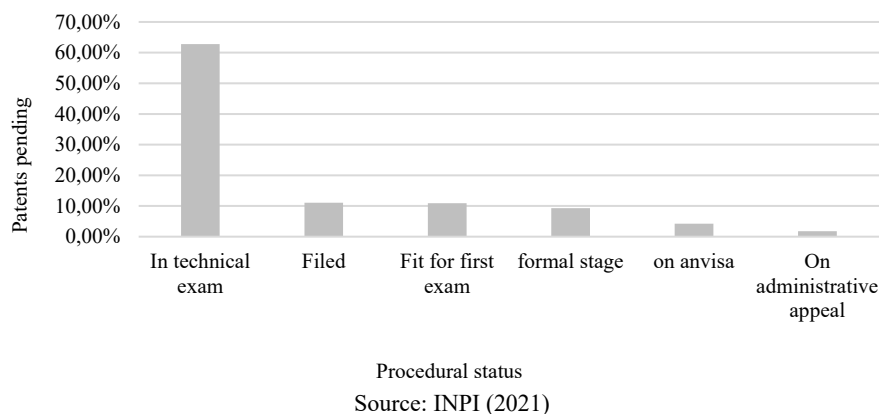
Of the total of 137,781 patent applications pending examination at the BPTO, 6,947 applications must observe the minimum term rule, this represents 5.04% (Figure 6). Therefore, this low number shows that the decision to invalidate the minimum term rule immediately impacts the shelf life of patents.

Figure 6. Pedidos pendentes que devem observar o prazo mínimo



Source: INPI (2021)

The procedural situation of these applications at the BPTO shows that most are in the technical examination phase (62.78%) and only 1.79% of the applications are in the last administrative phase, the administrative appeal (Figure 7). Comparing these data, from the patent applications already granted with the minimum term, of any of the classifications, to the applications still pending analysis, most (56.06%) of the granted patents observed the minimum term.

Figure 7. Requests that must meet the minimum deadline, by procedural situation

However, the patents still pending analysis represent only 5.04% of the total at the INPI, that is, although the minimum patent term rule has significantly impacted the granted applications, the same will not happen with the pending applications.

5 Conclusion

From the above, it can be stated that the term of validity of patents is 20 years for inventions and 15 years for utility models, not being authorized to grant patents with an extended term. But the rule is only valid after 05/12/2021, except for patents for pharmaceutical products. With this, there are patents still pending decision that must observe the minimum, extended term. The STF decision that invalidated the minimum term rule had a significant impact on the validity period of patents, because of the total number of patents granted until the decision, 53.35% observed the minimum term, that is, their validities are above 20 years, for inventions, and 15 years for utility models, which is significantly burdensome to the public coffers, notably in relation to health. However, the amount of years more than the maximum term of validity of the patents is less than 2 years, only 37 inventions were granted with a term equal to or greater than 10 years and 41 utility models with a term of 7 or more years. Of the patents pending decision at the INPI, only 5.04% must observe the rule, now extinct, of the minimum term, and 62.78% are in the technical examination phase. Thus, it can be concluded that, although most of the patents that the BPTO has granted have their term extended, the pending analyses that will still be impacted by the minimum term rule will be less than 5.04%. With this, it is possible to affirm that the decision solves, in part, the situation of the long term of validity of patents granted by the Brazilian State.

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SYSTEMATIC REVIEW IN THE IMPLEMENTATION OF THE GENERAL DATA PROTECTION LAW IN BRAZIL

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Abstract

This article aims to describe and analyze the production of empirical work on the implementation of the General Data Protection Law (LGPD) in Brazil. The article addresses the main themes explored in these works, the literature presented, and the research techniques used. The structure of the article follows the description and analysis of dissertations and theses defended in Law programs, as well as articles published in relevant journals. A quantitative description of the empirical production on the LGPD is carried out, followed by the identification of common techniques. Subsequently, a bibliometric analysis is carried out, identifying the regulatory topics covered and the network of authors cited. In general, this article reveals that empirical research on the LGPD is still incipient, with methodological and theoretical deficiencies that compromise its scientific rigor.

Keywords: *LGPD*; Data Protection; Privacy; Bibliometric Analysis.

Introduction

The General Data Protection Law (LGPD), established by Law No. 13,709/2018, came into force in Brazil on September 18, 2020, with the aim of protecting personal data, including in digital media, of a natural person or person public or private law. The LGPD represents a significant milestone in Brazilian legislation, aligning with international standards, such as the European Union's General Data Protection Regulation (GDPR). Since then, implementation and compliance with the LGPD have become topics of great academic and practical interest. The LGPD aims to protect the fundamental rights of freedom and privacy, as well as the free development of the natural person's personality.

In this context, the present work aims to analyze and outline the empirical production on the LGPD, focusing on theses, dissertations and articles published in law journals. Examining this production is essential not only to understand the impact of the LGPD on Brazilian society, but also to identify the challenges and opportunities that arise with its implementation. This understanding is crucial for the formulation of effective public policies, the improvement of data protection practices by companies and the promotion of a culture of privacy and information security. Furthermore, the analysis allows you to evaluate the benefits and limitations of the legislation, providing valuable insights for future revisions and adjustments to the law.

Empirical Research in LGPD

The literature review shows that most work on the General Data Protection Law (LGPD) is still in an early stage of development. Case studies, systematic reviews and theoretical analyzes predominate, however, there is a significant gap in robust empirical research. Among the existing works, we highlight the systematic review on the impact of the LGPD on data privacy carried out by Lohmann, Albuquerque and Machado (2020) and the case study on compliance with the LGPD in the public sector carried out by Alves and Neves (2023).

The methodology used in this analysis covers the selection of studies that explore theoretical, legal and practical aspects of the LGPD, with a particular focus on its implications for companies, public institutions and society in general. The selection of works was carried out based on criteria of relevance and contribution to the field of study, seeking to provide a comprehensive and critical view of the main issues and challenges associated with the implementation of and compliance with the LGPD.

Scope and Coverage of Legal Work on the LGPD

The General Data Protection Law (LGPD), enacted in 2018 and in force from 2020, emerged in response to the growing need to regulate the processing of personal data, strongly influenced by the General Data Protection Regulation (GDPR) of European Union. Brazilian legislation aims to guarantee the privacy of citizens' data and establishes clear guidelines on how information should be collected, stored and shared.

The LGPD addresses fundamental aspects of privacy and data protection. The literature review shows that the work focuses on several areas, such as compliance challenges, impacts on holders' rights and implications for organizations. There is a significant emphasis on studies that discuss the practical application of the LGPD, highlighting the difficulties faced by companies and public bodies in adapting to new legal requirements.

Brazilian legislation aims to ensure that the processing of personal data is carried out with respect for the fundamental rights of freedom and privacy, in addition to the free development of the natural person's personality. According to Fernandes and Nuzzi (2022), the LGPD introduces a robust set of principles, rights and obligations that are based on the protection of human rights, promoting good faith and security in the processing of personal data.

Among the principles established by the LGPD, purpose stands out, which determines that data must be processed for legitimate, specific, explicit and informed purposes to the holder; adequacy, which requires that the processing of data is compatible with the purposes informed to the holder; and necessity, which stipulates that processing must be limited to the minimum necessary to achieve its purposes. Furthermore, the law emphasizes the importance of transparency, ensuring that data subjects have access to clear, accurate and easily accessible information about the processing of their data.

Fernandes and Nuzzi (2022) also highlight the rights granted to data subjects by the LGPD, which include, among others, the right to access data, the right to rectify incomplete, inaccurate or outdated data, and the right to delete data unnecessary or excessive. The legislation also ensures the portability of data to another service or product provider upon express request, and the right to the deletion of personal data processed with the holder's consent, except in the cases provided for by law.

Another crucial aspect addressed by the LGPD is the responsibility and accountability of organizations that process personal data. The law requires companies to adopt security, technical and administrative measures capable of protecting personal data from unauthorized access and accidental or illicit situations of destruction, loss, alteration, communication or any form of inappropriate or illicit treatment. Organizations must also demonstrate the effectiveness of these measures, proving their compliance with data protection standards.

The influence of the GDPR on the drafting of the LGPD is evident, as both legislations share the same concern with the protection of personal data in an increasingly complex and interconnected digital environment. However, the LGPD also takes into account the particularities of the Brazilian context, adjusting protection mechanisms to better meet the country's needs and specificities.

Fernandes and Nuzzi (2022) emphasize that the promulgation of the LGPD reflects Brazil's commitment to creating a more reliable and ethical digital environment for its citizens, aligning with international data protection standards. The LGPD represents a significant advance in the regulation of the processing of personal data, promoting the security and privacy of individuals in a global scenario where information has become one of the most valuable assets.

In short, the LGPD was enacted not only to regulate the processing of personal data, but also to protect the fundamental rights of individuals, promoting transparency, security and responsibility in the use of information. The adoption of this legislation marks an important step in the modernization of data protection standards in Brazil, ensuring that the country keeps up with best international practices and offering a solid basis for the protection of its citizens' personal data.

Analysis of Theses and Dissertations

The identification of theses and dissertations defended in Law between 2020 and 2023 revealed a growing academic interest in the LGPD. Most works analyze the LGPD from a legal perspective, exploring the legal foundations and practical consequences. The quantitative analysis of these works indicates a significant increase in academic production on the topic after the LGPD came into force.

Several studies highlight the challenges faced by organizations when adapting their internal processes to the General Data Protection Law (LGPD). The work “Specification of Privacy Requirements in Compliance with the LGPD: Results of a Case Study” by Carina Alves and Moisés Neves, published in 2023, offers a detailed view of these challenges. According to the authors, compliance with the LGPD requires an in-depth understanding of legal requirements, as well as the adaptation of information systems to guarantee the protection of personal data effectively and securely.

Lohmann, Albuquerque and Machado (2020) reinforce this perspective, highlighting that compliance is not just a matter of implementing new technologies, but also involves a significant change in organizational culture. Companies need to create and maintain Data Protection Impact Reports (RIPD), which are essential instruments for assessing and mitigating the risks associated with the processing of personal data. These reports allow organizations to identify possible vulnerabilities and adopt appropriate preventive measures, aligning with the security and responsibility principles set out in the LGPD.

Through a case study in a judicial branch organization, Alves and Neves illustrate the complexity of the compliance process. The research identified that adapting to the LGPD requires not only investments in technology, but also the restructuring of internal procedures and the continuous training of employees. The complexity of the legislation and the need to adapt the work routine are highlighted challenges, showing that compliance with the LGPD is a continuous process that demands effort and dedication.

Furthermore, the research shows that creating a clear and accessible privacy policy is essential. This practice must be effectively communicated to all members of the organization, ensuring that they understand their responsibilities in the processing of personal data. The implementation of training and training programs is crucial so that employees are aware of the best procedures, as well as legal requirements.

The case study results presented by Alves and Neves show that, despite the challenges, compliance with the LGPD can bring significant benefits to organizations. Properly protecting personal data not only avoids legal penalties, but also strengthens the trust of customers and business partners, creating a reputation for responsibility and security. Research suggests that taking a proactive and preventive approach to data protection is essential for long-term success.

In summary, the studies by Alves and Neves, as well as those by Lohmann, Albuquerque and Machado (2020), emphasize that compliance with the LGPD is a complex process that goes beyond the simple implementation of technologies. It requires a cultural and organizational transformation, the development of clear policies, the creation of RIPDs and the continuous training of employees. These elements are crucial to ensuring the effective protection of personal data and so that organizations can operate securely and responsibly in the contemporary digital environment.

This research points to promising areas for continued academic and practical research. It is necessary to conduct more empirical studies to evaluate how the LGPD is being implemented in organizations and what the practical results of this implementation are. Investigating the specific challenges faced by small and medium-sized companies, carrying out comparative analyzes between the LGPD and legislation from other countries, and exploring the application of the LGPD in smart city contexts are areas that deserve attention. Furthermore, it is essential to expand the study of Privacy Impact Assessment (PIA) and Data Protection Impact Assessment (DPIA) methodologies, develop capacity building and training programs, and research the role of technological innovation in the protection of personal data

Analysis of research techniques

The research techniques used in theses and dissertations vary, including qualitative methods, case studies and document analyses. A common feature is the use of detailed legal analyses, with an emphasis on the interpretation of LGPD articles and their practical application.

Description and Analysis of Articles Published in Law Journals

The analysis of articles published in law journals shows a similar trend to theses and dissertations, with significant emphasis on legal interpretation and the practical application of the LGPD.

According to the study by Canedo et al. (2020), many IT professionals face difficulties in understanding and applying LGPD requirements due to a lack of specific knowledge about privacy and data protection. Hadar et al. (2020) reinforce the need for systematic approaches to specifying privacy requirements, proposing the use of ontologies and conceptual models to guide the development of software systems compliant with the LGPD.

The approach proposed by Alves and Neves (2023) involves the definition of privacy standards validated by a multidisciplinary committee, including IT professionals and legal experts. These standards are based on ontologies and catalogs of privacy concepts, providing a clear and reusable framework for specifying requirements. The application of this approach in the Nísia system, an application for monitoring protective measures, demonstrated its effectiveness in ensuring compliance with the LGPD, protecting sensitive data of women victims of domestic violence.

The work by Thalyta Soares de Farias, presented in 2020 and entitled "Privacy, Monetization of Personal Data and the LGPD: challenges and impacts of Law nº 13,709/2018", addresses the creation of the LGPD in the contemporary social and technological context. Farias highlights the redefinition of the right to privacy in the face of technological innovation and the data economy, focusing on the monetization of personal data and the use of algorithms for manipulation and behavioral prediction. Its critical analysis of the LGPD principles and the challenges faced by the National Data Protection Authority (ANPD) contributes to an in-depth understanding of the law's implications in different sectors. However, the study highlights the need for more empirical research into its practical effectiveness.

In 2021, Pedro A. Lohmann, Carlos Albuquerque and Raphael Machado published the article "Systematic Review for the Impact Assessment Process on Personal Data Protection and Privacy", which carries out a systematic review of the literature on Protection Impact Assessment (DPIA) and Privacy Impact Assessment (PIA). The research focuses on academic contributions in the context of LGPD, highlighting the importance of DPIA and PIA as specific risk assessment mechanisms for data subjects. The systematic methodology adopted ensures a robust analysis, although the limitation to articles in English may exclude relevant contributions in other languages.

In 2023, Randys Machado Coelho presented his study "Protecting the Privacy of Personal Data in Brazil: Analysis of the Data Protection Law (LGPD)", which discusses digital transformation and the risks associated with collecting, storing and sharing personal data, emphasizing the importance of LGPD. Coelho offers a clear overview of the main concepts and challenges faced by companies in implementing the law but suggests that a more detailed analysis of the specific challenges faced by small and medium-sized companies could further enrich the discussion.

In the same year, the article "LGPD, Smart Cities and Privacy", authored by Cavalcanti Neto, explores the implementation of LGPD in the context of smart cities, analyzing the challenges and opportunities related to compliance with the law in urban environments that use advanced technologies. The research proposes practical methodologies, such as the use of data protection impact assessments (DPIA), highlighting the complexity of ensuring compliance with the LGPD in IT systems in smart cities. The detailed analysis and practical proposals are strengths of this study, which could benefit from more empirical studies and a comparative analysis of international cases.

Still in 2022, the article "Fundamentals of the General Data Protection Law (LGPD): A narrative review" (Fernandes and Nuzzi) presents a narrative review of the fundamentals of the LGPD, highlighting the main legal, technical and administrative aspects involved in its implementation. This study addresses the historical evolution of data protection legislation in Brazil and compares the LGPD with the European GDPR, providing a detailed understanding of the legal and technical aspects of the LGPD. However, it lacks empirical data and case studies for a more robust practical application.

The article "General Data Protection Law (LGPD): Right to Privacy in the Globalized World and the Civil Liability of Agents", published in 2023 and authored by Lessi, analyzes the LGPD in the context of privacy in the globalized world and civil liability of data processing agents. The research discusses the fundamental principles of the LGPD, and the challenges faced by Brazilian companies in its implementation, offering a clear view of the importance of the LGPD, but suggesting that more practical examples of how companies are adapting to the new legislation could enrich the study.

Carina Alves and Moisés Neves, in 2023, presented "Specification of Privacy Requirements in Compliance with the LGPD: Results of a Case Study", which addresses the specification of privacy requirements in compliance with the LGPD through a case study in an organization of the judiciary. The research identifies challenges such as the complexity of legislation and the need to adapt the work routine, proposing an approach based on privacy standards. Although the study offers a practical view of the challenges faced, the limitation to a single organization restricts the generalization of the results.

Finally, the article by Jaqueline Barros Pimentel and Hugo Garcez Duarte, "The implementation of the right to privacy in Brazil according to the General Personal Data Protection Law (LGPD)", published in Vox Magazine in 2023, analyzes the implementation of the right to privacy in Brazil based on the LGPD. The study adopts a qualitative approach to examine the main legal provisions of the LGPD and the challenges faced in its implementation by Brazilian companies. Digital transformation and the massive collection of personal data are highlighted as factors that increase the need for privacy protection. The article offers a clear view of the importance of the LGPD but suggests that a more practical analysis of how companies are overcoming implementation challenges could further enrich the study.

Academic production on the LGPD in Brazil, especially between 2020 and 2024, reflects a significant effort to understand and implement this complex legislation in different contexts. These studies provide a solid foundation for future compliance research and practice, highlighting the importance of a systematic and practical approach to addressing the challenges of protecting personal data. However, there is a clear need for more empirical studies and practical examples to validate and improve the proposed methodologies, especially in varied contexts such as small and medium-sized companies and smart cities.

The reviewed works suggest several promising areas for continued research on the LGPD. Firstly, it is necessary to conduct more empirical studies to evaluate how the LGPD is being effectively implemented in organizations and what the practical results of this implementation are. This will help identify strengths and areas for improvement in law enforcement. Another relevant aspect is the investigation of the specific challenges faced by small and medium-sized companies in adapting to the LGPD. Understanding these obstacles and developing strategies that can help these companies comply with legislation is crucial to ensuring broader and more effective compliance. Carrying out comparative analyzes between the LGPD and data protection legislation from other countries, such as the GDPR in the European Union, can be very useful in identifying best practices and areas for improvement.

These international comparisons can offer valuable insights on how to improve the application of the LGPD in Brazil.

In the context of smart cities, it is essential to explore how LGPD can be effectively applied in urban environments that use advanced technologies. Ensuring the protection of personal data across complex, interconnected systems is a significant challenge that requires innovative approaches and robust practices. Expanding the study of Privacy Impact Assessment (PIA) and Data Protection Impact Assessment (DPIA) methodologies is also essential. These methodologies need to be accessible and applicable to all organizations, regardless of size, so that they can effectively assess and mitigate privacy-related risks. Developing qualification and training programs for professionals from different areas is another priority. Improving the understanding and application of the LGPD through ongoing education and training can increase the effectiveness of personal data protection in Brazil. Finally, it is important to research the role of technological innovation in protecting personal data. Understanding how new technologies can be aligned with LGPD principles can help develop solutions that not only comply with legislation, but also promote a safer and more ethical digital environment.

Continuing this research is essential to ensure that the LGPD is not just legislation on paper, but an effective practice that protects the privacy of Brazilian citizens in an increasingly digital and interconnected world.

Final Considerations

This systematic review on the implementation of the General Data Protection Law (LGPD) in Brazil reveals a scenario in full development, albeit initial. The analysis of empirical work produced between 2020 and 2023 demonstrates both significant contributions and methodological and practical challenges that need to be overcome.

Research by Lohmann, Albuquerque and Machado (2020) and Alves and Neves (2023) shows that the LGPD brought a comprehensive set of principles, rights and obligations, focusing on the protection of personal data. However, the practical implementation of these principles presents notable difficulties, especially for small and medium-sized companies, as pointed out by Coelho (2023). The adaptation of information systems and the continuous need for professional training are frequent obstacles mentioned in the literature, reinforcing the analysis by Alves and Neves (2023).

The lack of solid empirical studies is a constant methodological challenge, highlighting the pressing need for more research to validate and improve the proposed methodologies.

Comparison with other international legislation, such as the GDPR, provides valuable insights to improve the application of the LGPD in Brazil. Studying the implementation and challenges faced by countries that adopted the GDPR allows us to identify best practices and possible adaptations for the Brazilian context. This comparative analysis helps to anticipate problems, adapt effective solutions and ensure that the LGPD not only fulfills its objective of protecting personal data, but also remains up to date and effective in the face of constant technological and social developments.

Investing in the training and ongoing training of professionals involved in the processing of personal data is essential to ensure compliance and effectiveness of the LGPD. Comparative analyzes with international legislation, such as GDPR, help to identify best practices and adapt effective strategies. In the context of smart cities, it is essential to apply

the LGPD in technologically advanced urban environments, ensuring the protection of personal data in interconnected systems.

Furthermore, it is necessary to expand the study and application of the Privacy Impact Assessment (PIA) and Data Protection Impact Assessment (DPIA) methodologies, making them accessible to all organizations. The continuity of this research is vital for the LGPD to become an effective practice, protecting the privacy of Brazilian citizens in an increasingly digital and integrated world.

This research contributes to the advancement of knowledge about the LGPD, highlighting the importance of a practical and effective methodological approach to face the challenges of protecting personal data in Brazil. By promoting greater understanding and application of the LGPD, we seek to ensure that the legislation not only protects citizens' privacy, but also remains relevant in the face of constant technological developments.

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SOCIETY AND THE DISPOSAL OF TECHNOLOGICAL WASTE: A DIFFICULT MISSION FOR CONSTITUTIONAL PROTECTION OF THE ENVIRONMENT

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Abstract

Considering that the issue of technological waste is a global phenomenon, complex and of great proportions, the present work sought to demonstrate in a brief historical context, that technological evolution has brought many benefits, and with them, environmental consequences. In this sense, the risks of inadequate disposal of electronic waste were assessed, through an analysis of the planned obsolescence of new technologies. Therefore, post-industrialization technological evolution has led to a series of concerns in the political, social and legal scenario regarding the protection of the environment, leading to the advent of laws, which aim to constitutionally protect the environment, as this is a fundamental right of third dimension that constitutes collective ownership, and directly reflects on the affirmation of human rights, on their collective and diffuse interests, thus demonstrating the relevance of this theme. The general objective of this research was to investigate the protection of the environment through social awareness about the disposal of technological/electronic waste, in view of the constitutional protection of the environment. The method used was bibliographic, using various sources of bibliographic and documentary research. The results found helped to reflect on possible solutions to minimize the problems of inadequate disposal of technological waste, through social actions to reuse this equipment and the contribution of society and companies to reverse logistics.

Keywords: Technological Waste; Environment; Society; Consumption; Disposal.

Introduction

Although technological advances in contemporary societies have brought numerous benefits, they have also brought significant challenges to the preservation of the environment, including the difficult task of properly disposing of technological/electronic waste.

This is because electronic waste, currently known as “e-waste”, is any material that contains heavy metals in its composition, and, therefore, the irresponsible disposal of large or small electronic devices, such as batteries, cell phones, headphones, computers, household appliances, among which, when improperly discarded, represent a major threat to the environment.

Thus, considering that Brazil is today the largest producer of electronic waste in Latin America and the fifth in the world, with approximately 2 million tons of so-called “e-waste” per year, behind only China (10.1 million tons), USA (6.9 million tons), India (3.2 million

tons) and Japan (2.5 million tons), according to data released by the United Nations University and international partners, through the According to The Global E-waste Monitor 2020 report, the majority of inappropriately discarded waste goes to vacant land (waste) or landfills, where soil and groundwater contamination occurs due to the toxic material released by this waste.

In this sense, the purpose of this joint analysis is intrinsically linked to the relevance of the proposed theme, as the motivational factors that justify the present work were due to its academic and social relevance in the context of constitutionally protected environmental law.

.Thus, in the face of such a disturbing scenario, considering that environmental law is a fundamental right of the 3rd dimension, which must meet the collective and diffuse interests of society by constituting collective ownership, the present work intends to demonstrate that the inappropriate destination of Electronic waste is a difficult mission for the constitutional protection of the environment, especially in view of its toxicity, which has resulted in an unprecedented environmental crisis and brought discussions in the social, political and legal scenario. Given this, the question arises: “How can we minimize the environmental impacts resulting from the inadequate disposal of technological waste?”

Therefore, the present work uses the exploratory-bibliographical research method, using research sources through books, magazines, articles, doctrines, jurisprudence, and legal, constitutional and infra-constitutional provisions. It is classified as descriptive research and theoretical analysis.

Therefore, the general objective of this study is to investigate the protection of the environment through social awareness about the disposal of technological/electronic waste, in view of the constitutional protection of the environment, given that the environmental issue is a multidimensional, global phenomenon that affects the human community.

The specific objectives of this study are to discuss national and international legal mechanisms for environmental protection; understand the historical evolution and fundamentals of environmental protection; inquire about electronic waste disposal; identify possible solutions to minimize impacts on the environment.

The introduction must contain, at a minimum, the following elements: theme, contextualization, brief description of the problem, justification of the study, objectives, results, and suggestions for future research, if any.

Since this study does not intend to be exhausted with the present topic, given its social relevance, it intends to transcend academic barriers through its publication, to provide the dissemination of knowledge, also serving as a basis for similar studies.

The Trash: Historical Summary

Over the centuries, several problems have become evident regarding the evolution of humanity, since, since the beginning, everything that is no longer useful is thrown away. It is in this context that the first concept of trash emerges, because, in Ferreira's view (1986, p. 1042), trash is “everything that is useless and is thrown away; dirt; dirt; filth; useless, old, worthless thing or things.” (*our translation*)

However, in the early days, waste production was only organic, derived from resources extracted directly from nature by man and again absorbed by it. However, with human and social evolution, people who were previously nomadic began to form small urban centers, like the people of Mesopotamia, around 3,500 BC, and because of this, there was the

emergence of cities, which developed consumption structures, with the creation of trade in products and their derivatives, starting to dispose of their waste in greater volumes in nature.

In the Middle Ages, with the growth of cities, the lack of structure and hygiene, culminated in epidemics that marked the beginning of the medieval period, among them, the most famous was the Black Death in 1348, which spread throughout Asia and Europe. According to Velloso (2004), the emergence of diseases is directly related to the volume of waste, because of consumption and population growth in cities, which increased the production of organic waste, food waste and human waste, attracting insects and parasites, leading to diseases and increased mortality.

Another major historical milestone was the Industrial Revolution in the 18th century, as man's relationship with the environment was significantly altered through changes in production and consumption patterns, which resulted in waste due to the ease in obtaining products. manufactured on a large scale. The beginning of industrialization led to serious consequences for the environment that are reflected today.

Thus, the 19th century had its landmark because of the industrialization process, as well as the emergence of public health issues, regarding the production of waste and its disposal, bringing the need for cities to pay attention to sanitation issues. and disposal of waste away from urban centers, with the creation of landfills.

In the 20th century, the development of the means of production became increasingly technological. There was a rise in capitalism, and as a result, greater exploitation of natural resources, through the increase in consumer goods using technology.

In place of that rural conglomerate, based on the production of agricultural goods, and which took 10 thousand years to generate industrial society, this post-industrial, modern, contemporary society came into existence, in which environmental degradation and pollution take on clear out-of-control contours, It is no longer possible for man to manage nature as in past centuries (Terence, 2020, p.29). (*our translation*).

This led to increasingly greater environmental problems, as, Fontenelle (2002) states, that with industrialization, there was the emergence of a disposable culture, which is based on “economic efficiency values”, these being incessantly replaced, due to to competition, for even more economically efficient values, thus generating unbridled consumerism.

Thus, with this evolutionary process, time became increasingly scarce, and the development of new technologies within an increasingly consumerist society, meant that the disposal of solid waste and mass production created a disposable culture, directly impacting the volume of waste dumped into the environment.

Thus, the 21st century still suffers the impacts of this increasingly technological industrial evolution, with a capitalist and consumerist society, linked to unbridled population growth, which, in 2023, according to the UN, the world population will reach 8.7 billion of people, all of them producing all types of waste, which results in an ecological crisis that is difficult to contain. For Ayala (apud Ferreira, 2004, p.231):

In the 21st century, we have reached what is conventionally called a “risk society”, that is, one in which the task of presenting adequate solutions to the conflict between technological development and the obligation to establish limits to own capacity to intervene in the environment (Ayala, apud Ferreira, 2004, p.231). (*our translation*).

Given this historical context, the difficult mission stands out given the need to create specific socio-environmental laws and other solutions that must be structured so that technological development does not further degrade the environment. That was why, in the 1970s, international conventions emerged that aimed to protect the environment through proposals to solve the problem. “Since then, nations have begun to focus and frame the need for conservation as goals to be achieved for their own sustainability” (Terence, p.29, 2020). (our translation).

The following topic will deal with the emergence of international conventions, which aimed to adapt goals for the economic and sustainable growth of the countries involved.

International Environmental Protection Conventions

The first discussions about concerns about the environmental scenario arose in the 1970s, when the world was discussing questions about the imminent scarcity of natural resources in the face of human exploitation.

It is, therefore, in this context that the first conventions in favor of environmental balance emerged, with Stockholm being the city chosen to host the first World Conference on the Human Environment, which was held in June 1972. This was an important landmark in the discussion on the environment and sustainable development, and brought as a reflection to Brazil, the creation of the Special Secretariat for the Environment (SEMA) in 1973, today, linked to the Ministry of the Interior (MINTER) which is responsible for executing environmental protection actions.

Since the Stockholm convention, global awareness about solid waste and the environment has emerged. In this sense, Ziglio (2005) comments that “it was only in 1989, with the Convention on the Transboundary Movement of Hazardous Waste, known as the Basel Convention, in Switzerland, that there was concern about the risk to the environment and human beings in relation to the transport of waste. dangerous internationally.” (*our translation*). According to Barreto (2009), “in 1992, the biggest Brazilian postcard, Rio de Janeiro, hosted the United Nations Conference on Environment and Development, which became known as Eco-92 or Rio-92. It was the starting point for environmental and ecological awareness to definitively enter the agenda of the five continents”. (*our translation*).

With Rio-92, Brazil gained great prominence, so much so that in 2002, the third world conference called Rio + 10 took place, bringing to debate the challenges for environmental conservation, promoted by the United Nations. Given this brief context about Brazil's international participation in a conference on the environment, the following topic will delve deeper into the subject, bringing to the fore Brazilian legislation, solid waste, and electronic waste policy.

Brazilian legislation and solid waste policy

The Federal Constitution of 1988 can be considered an innovative Constitution, as the Magna Carta contains in its text chapter VI, which specifically deals with the issue of the environment, recognizing that it is linked to 3rd dimension fundamental rights, on the which is incumbent on both the public authorities and the community itself, the duty to ensure a balanced environment, as it is a collective ownership. In this regard,

the right to life, guaranteed as a fundamental right, including as a principle of Environmental Law, and guaranteed by the dignity of the human person, gains substantial reinforcement in terms of the right to an ecologically balanced environment. These are rights that complement and strengthen each other (Machado, p.160, 2018). (*our translation*).

Terence (2020, p.98) reminds us that “the 1988 Constitution innovated, even surpassing the most recent foreign Constitutions (Bulgaria, art. 31; former USSR, art. 18; Portugal, art. 66; Spain, art. 45) with regard to environmental protection, raising to the constitutional level a topic that is still little disseminated in national doctrine and jurisprudence”. (*our translation*).

In this context, some scholars bring interpretations about the paragraphs and the caput of the art itself. 225, of CF/88, which says the following: “Art. 225. Everyone has the right to an ecologically balanced environment, an asset for the common use of the people and essential to a healthy quality of life, imposing on public authorities and the community the duty to defend and preserve it for present and future generations”. (*our translation*). On this topic, the Federal Supreme Court took a position, otherwise let us see:

The right to the integrity of the environment – a typical third generation right – constitutes a legal prerogative of collective ownership, reflecting, within the process of affirming human rights, the significant expression of a power attributed, not to the individual identified in their singularity, but, in a truly more comprehensive sense, to the social community itself” (STF, MS 22.164-0 SP, Rel. Min. Celso de Mello, j. 30-10-1995, emphasis in the original). (*our translation*).

Terence (2020, p.102) lectures that “although not provided for in art. 5th of the Constitution, an ecologically balanced environment is a fundamental right precisely because it matters for a healthy quality of life”. (*our translation*).

This is because, according to the author, the caput of the aforementioned article already contains in its writing a list of fundamental rights, claiming that “an ecologically balanced environment is everyone's right”; that “it is a good for the common use of the people” (polluter pays principle); the environment is “essential to man's healthy quality of life” (*our translation*) (fundamental human right, life.); The Public Power and the community have the duty to defend and preserve it for present and future generations (democratic principle).

In addition to the constitutional protection of the environment, in 1981 Brazil, through Law 6,938/81, established the National Environmental Policy that addresses three important items; I - the development, in the country, of research and technological processes aimed at reducing the degradation of environmental quality; II - the manufacture of anti-pollution equipment; III - other initiatives that enable the rationalization of the use of environmental resources.

Furthermore, in art. 6th of the law, SISNAMA (National Environmental System) was created Environment). Thus, the Superior Body, CONAMA (National Council for the Environment), has the function of “assisting the President of the Republic in the formulation of guidelines for the National Environmental Policy” (*our translation*), this being one of the most evident bodies in the environmental scenario, especially about technological waste.

During Brazilian legislation, protection laws emerged gradually according to the need for implementation. In this sense, Law 9,605/98 brought in its text criminal and

administrative sanctions for environmental crimes, against fauna, flora, pollution, among others.

Thus, in 1999, the National Congress, through Law 9,795/99, instituted the National Environmental Education Policy, bringing environmental education to debate through actions of the Public Power, media, companies, and civil society, with the purpose to promote environmental education in social spheres, through encouragement, cooperation, and participatory actions in preserving the environment in the face of sustainability.

The National Solid Waste Policy (PNRS) was established by Law No. 12,305/10, regulated by Decree No. 7,404/10. Among the concepts introduced into environmental legislation by PNRS are shared responsibility for the life cycle of products, reverse logistics and sectoral agreement. According to Paiva (2015), shared responsibility for the life cycle of products is the set of individualized and linked responsibilities of manufacturers, importers, distributors and traders, consumers and holders of public urban cleaning and solid waste management services. , to minimize the volume of solid waste and rejects generated, as well as to reduce the impacts caused to human health and environmental quality resulting from the life cycle of products, in accordance with this Law.

In this context, it is important to highlight that Brazilian States have specific legislation by the CPHR of the National Environment Agency, among which, in the Northeast, the State of Pernambuco also has a State Solid Waste Policy, implemented by Law 12.008/2001 , and its scope is to hold people responsible for environmental damage caused post-consumption in the face of services and products, seeking to implement incentives for recycling in industries.

Furthermore, Decree 23,941/2002, from the government of Pernambuco, which regulated law 12,008/2001, mentions technological waste in its articles.

Art. 57. It is prohibited to dispose of lamps, cells, batteries and electronic products that contain them integrated into their structure in a non-removable manner, in inappropriate places not authorized for this purpose, respecting the rules established in the relevant legislation.

Art. 58. Traders of machinery and equipment for industrial use, motor vehicles, electronic products, games, toys, electrical tools, telephones, computers, flashlights, watches, hearing aids and any similar products that contain batteries integrated into their structure in a non-removable manner, are obliged to treat and dispose of the waste. (*our translation*).

Laws on technological waste, both at the federal, state and municipal levels, reflect the growing concern with this issue.

Brief Classification of Waste

Bearing in mind that the concept of waste is linked to everything that is no longer useful to people, resulting in its disposal, it has classifications regarding its composition, otherwise let's see:

i. Domestic waste: is the set of waste that is produced by individuals in their homes, in addition to commercial and service units;

ii. Industrial waste: consists of waste produced by industries, therefore it includes a variety of materials, including toxic ones;

iii. Hospital waste: waste from various healthcare units, which is quite dangerous, as it may, for example, be contaminated with pathogens;

iv. Agricultural waste: waste from agricultural production units, which includes, for example, toxic materials, such as pesticide packaging;

v. Electronic waste: is a specific category of waste that has grown a lot in recent years, which is equivalent to various discarded electronic equipment, which falls under the list of hazardous waste; It is

saw. Radioactive waste: it is a very particular type of waste, originating from radioactive materials, which is considered dangerous due to its toxicity.

It is known that the disposal of waste, in general, must meet selectivity in its disposal, regardless of its classification, as the importance of selective collection concerns the contribution and preservation of the environment, aiming at sustainable consumption to reduce impacts. environmental issues due to incorrect waste disposal.

According to Rocha (2007a), when it comes to a simple computer monitor, “the electromagnetic radiation emitted by monitors, when used for a prolonged period of time, can cause brain fatigue and even cancer (...) If they are sent to landfills, they can contaminate soil and water with heavy metals, if incinerated they contaminate the atmosphere”. (*our translation*).

Waste separation contributes significantly to the use of reusable materials through recycling and reverse logistics, the latter being used for technological waste, given that the appropriate disposal of waste provides the generation of employment and income for society, in addition to fulfilling its social function in favor of the ecosystem.

In this attempt, it is important to highlight that the inadequate disposal of any waste, especially technological waste, is an issue of great social relevance, as, in general, the composition of these devices contains metals such as lead, nickel, mercury, plastics, among other heavy metals already regulated by ABNT technical standards, which are absolutely toxic and extremely dangerous for human health and the environment, as shown below.

Technological and electronic waste

It is indisputable that waste and its trajectory have been shaped throughout the historical evolution of humanity. What is understood as something “worthless” is definitively discarded as leftovers or remnants of something of no use, then becomes Garbage.

Technological waste is understood as the disposal of products such as: computers, batteries, computer equipment, TVs, microwaves, camcorders, lamps, and electronics, portable electronics such as radios, stereos, headphones, DVDs, cell phones, mp4 players, etc.

Although technology has brought practicality and benefits to today's society, the planned obsolescence of these technological products that will be discarded (technological waste or e-waste) has caused major problems for the environment.

With the advent of new technologies that have seen great growth in recent decades, the emergence of new “launches”, in increasingly shorter periods, gives way to more technological and more efficient ones. “Technological news” leads to unrestrained

consumption and the constant exchange of these for others that are increasingly “modern” and theoretically “better”.

Hence the great problem raised about the consumption of new technologies, which is precisely what to do with these products that are exchanged for launches and consequently discarded? This has been a difficult mission for modern society, since today, products quickly become obsolete, inducing a vicious circle of consumption.

In this sense, everything that is no longer directly useful to those who acquired it should not be discarded in any way. Because incorrect disposal of this type of waste, due to its toxicity and heavy metal composition, can cause serious damage to nature and living beings.

According to the Ministry of the Environment, it is important to pay attention to sustainable and conscious consumption. In other words, for sustainable consumption to occur, fewer natural resources must be used in the means of production. This is because the unrestrained consumption of contemporary societies generates an increasing scarcity of natural resources.

The consumer society is premised on satisfying human desires in a way that no society in the past could achieve or dream of. The promise of satisfaction, however, will only remain seductive as long as the desire remains unfulfilled; what is more important, as long as there is a suspicion that the desire has not been fully and completely satisfied (Bruman, 2009, p. 105). (*our translation*).

Therefore, it is indisputable that consumption is intrinsically linked to human desire, however, unconscious consumption becomes inconsequential, and environmental awareness, adequate disposal, reuse (reverse logistics) and waste recycling are not yet part of a cultural structure of current societies.

To this end, it is necessary to understand the situation of Brazilian environmental protection legislation, however, there is a need to put into practice incentive actions to preserve the environment already provided for by law, and which must be effectively applied by both civil society, companies, as by the government itself.

Technological Pollution: Combating Actions

Regarding actions to combat technological pollution, it is important to highlight that education through awareness occurs in society through public policies, through actions from different social spheres. In fact, there must be joint action between public authorities, companies, and civil society.

The establishment of projects in needy communities, such as the donation of restored technological equipment, or even suitable for use, such as TVs, computers, stereos, could benefit those who are unable to acquire this technology, with it being reused by who needs it, promoting the so-called “digital inclusion”.

Bearing in mind that laws are fundamental for regulating the disposal of electronic waste, however, they could be more specific to manufacturers regarding the disposal of this waste, obliging them to produce equipment that is less harmful to human health and the environment, however, To aim for sustainability, it is necessary for the legislator to monitor these implemented policies, without prejudice to economic development, aiming for future generations.

We can take as an example the production of battery-powered electric cars, which would theoretically be good for the environment as they are less polluting, sold as a form of “clean” energy. But would they really be? And don't the batteries in these vehicles contain heavy metals in their composition? Even if they try to produce technology to improve the emission of gases into the atmosphere, this technology is still polluting if there is not adequate disposal.

The change in consumption patterns is a relevant point that must be in line with the constitutional protection of the environment, through the principles that govern environmental law and that include collective and diffuse interests, mainly because it is a third-generation fundamental right.

Reverse Logistics, a Solution for Constitutional Protection of the Environment?

The website *Eletrônicos Ambiental* (2019), in a brief article, which deals with reverse logistics, informs that electronic waste cannot be classified as common waste, as they are part of a group that has a specific classification, which are first grouped as solid waste, then, according to ABNT NBR 10004 standards, is classified as class 1, that is, dangerous. NBR 16156:2013, according to Maurício Ferraz.

The repercussions regarding environmental responsibility are not yet evident in the social scenario. This is because an educational policy is necessary, implemented in society, through basic school education, aiming to educate for future generations.

Understanding that all human development has resulted in a consumer society, where technology advances considerably and the exchange of products is much more intense, some companies that practice reverse logistics are generally made up of “manufacturers, importers, traders and distributors of packaging and products sold in packaging”.

Large companies such as Coca-Cola, AMBEV and Natura, for example, have already implemented this practice with their returnable products, which are, in general, recycled by their own industries and returned to the end consumer with new products. In the technological sector, there is the recovery and/or extension of the useful life of products or their components. This involves the practice of re-manufacturing, especially “in sectors such as electronics and automotive, where products are reconditioned and reintroduced into the market”, according to the website of Bling, one of the many companies providing reconditioning in the logistics sector.

The practice of reverse logistics aims to minimize environmental impacts and corroborates the constitutional protection of the environment, being in accordance with the national solid waste policy, established by Law No. 12,305/10, as already commented in a specific topic.

It turns out that this type of logistics is mandatory for manufacturers and traders of products such as pesticide residues (packaging), batteries, oils, tire rubber, fluorescent lamps and other types, plastic, metal and glass and electrical and technological products and materials, which has heavy metals in its composition.

From the perspective of the laws in force in the country, and particularly our Magna Carta of 1988 in its chapter VI, although the environmental issue has legal and Constitutional protection that is equivalent to a fundamental right, it is necessary to implement solutions, that can be adopted for environmental protection by companies, and by society in general, aiming to minimize impacts on the environment.

Final Considerations

The present study sought to demonstrate that historically the problem of garbage is an old social concern. However, about the great advances of the 21st century, this topic has become increasingly relevant, especially in relation to technological waste and its destination and disposal.

It was observed that discussions about environmental protection that began in the 70s are a topic that remains recurrent to this day. National and international congresses linked to the environment have become a scope for legislative production on the world stage. In this sense, the events were considered as a positive premise for Brazil, in its Magna Carta, to consolidate the right to the environment as a fundamental right of the 3rd dimension. From then on, other national laws emerged, with the aim of protecting the environment for future generations with the constitutional corollary.

In this attempt, it was observed that the Stockholm Conference and the 1992 Conference in Rio de Janeiro (ECO-92) made the world awaken to the problem of environmental damage in the consumer society. One of its main objectives is to promote sustainable development for future generations.

The lack of social awareness, in relation to the unrestrained consumption on a large scale, contributes to the dangerous increase in the production of "e-waste", placing Brazil in the 5th place ranking in the world. This worrying information was linked to one of the main premises of this study, as it was demonstrated that the inappropriate disposal of electronic waste is a difficult mission for the constitutional protection of the environment, mainly in view of its toxicity, which has resulted in an environmental crisis without precedents and bringing discussions in the social, political, and legal scenario. Given this, the question was: "How can we minimize the environmental impacts resulting from the inadequate disposal of technological waste?"

The present study investigated the dichotomous relationship between the conscious use and disposal of electronic waste, with the digital era being one of the biggest reasons for the growing consumption of electronic equipment, in an increasingly consumerist world eager for technological innovations, in which planned obsolescence of products launched recently give way to a more innovative one. Combining: population increase and consumption, the result is an environmental crisis that is getting bigger every day.

In this sense, it can be said that reverse logistics is a possible solution, although it is an existing practice and provided for in Law No. 12,305/10 which deals with solid waste, it contributes to civil society being more participatory and collaborative, through of public policies to raise awareness about the proper disposal of electronic waste. Finally, this work recognizes the importance of constitutional protection of the environment, promoting the creation of laws in the Brazilian legal system that regulate the disposal of waste, especially the so-called "e-waste", in addition to imposing sanctions on those who do not respect the environmental standards.

Although Law 9,795/99 deals with environmental education in social spheres through encouragement, cooperation and participatory actions in preserving the environment in the face of sustainability, it cannot be forgotten that civil society also has great power in its hands, as With regard to the right to choose in consumer relations, the final consumer can choose companies that produce less polluting products and that have policies related to the laws in force, from the perspective of post-consumption responsibility, as an essential practice for human survival.

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THE “NEW” ADMINISTRATIVE IMPROBITY LAW AND ITS INNOVATIONS WITHIN THE SCOPE OF BRAZILIAN ADMINISTRATIVE LAW

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Abstract

The main theme of this work is to analyze the main changes brought about by the new Administrative Improbability Law, Law No. 14,230/2021, especially with regard to the retroactivity of the law, the constitutional principles that govern Public Administration, acts of administrative improbity, to public agents who perform public functions, the comparison between Law No. 8,429/92 and Law n° 14,230/21, as well as the existing correlation between legal pluralism and the law of administrative improbity. The article also presents the definitions of probity and administrative improbity and the concepts of public agent and Public Administration. To this end, bibliographical research was carried out on the changes to the new Improbability Law, analyzing doctrine and jurisprudence of the Federal Supreme Court, the Superior Court of Justice and federal legislation on the subject, as primary data, but also consulting periodicals and articles scientific data, such as secondary data. The objective of the research is to show that the retroactivity of the law, as the most beneficial sanctioning norm, should be applied to actions that have not yet become final, that is, to actions that are still ongoing.

Keywords: Administrative Law; Retroactivity of the Law; Administrative Principles; Administrative Misconduct Act. Legal Pluralism. Theme of General Repercussion.

Introduction

In our country, for many years the topic of corruption, in addition to becoming a topic of great prominence, has become a recurring theme. Such conduct, which signifies dishonesty in dealing with public matters, is called an act of administrative improbity. For this reason, it was necessary to create specific legislation to deal with this subject, and therefore, with the aim of moralizing the Public Administration, the Administrative Improbability Law was created, Law No. 8.429/92, which was later amended through of Law No. 14,230/21 (the new law did not repeal the previous one).

The “new” Administrative Improbability Law, Law No. 14,230/21 provides for the sanctions applicable due to the practice of acts of administrative improbity, as referred to in § 4 of art. 37, of the Federal Constitution, and also presents some considerations, based on the investigation of a specialized bibliography within the scope of the doctrine and jurisprudence of the Superior Courts, especially with regard to the retroactivity of the law (Theme 1199, a topic of general repercussion, judged by the Federal Supreme Court – Rapporteur Minister Alexandre de Moraes).

The new LIA (Administrative Improbability Law) promoted significant changes in the procedural scope, considering acts of improbity those listed in articles 9, 10 and 11. One of the changes brought by the law is the requirement of intent (it is necessary to prove subjective responsibility) on the part of the public agent, that is, there must be the intention to commit the crime, this being one of the main changes, thus extinguishing the culpable modality of improbable acts that cause damage to the treasury, that is, the public agent will be the target of action of improbity if he acted deliberately with intent when committing an irregularity.

About the retroactivity of the law, the legislator innovated when dealing with the intercurrent prescription (article 23, caput and § 5, of Law No. 8,429/1992, as amended by Law n° 14,230/2021), so that greater speed can occur jurisdiction in relation to illegal acts carried out by the public agent.

Based on the caput of Article 37, of CF/88, the Public Administration, whether Direct or Indirect, of any of the Powers of the Union, the States, the Federal District or the Municipalities must comply with administrative principles, be they: legality; impersonality; morality; advertising and efficiency. About administrative morality, each act carried out by an administrative agent in the Public Administration must be governed by the principle of morality, which requires the public administrator to comply with ethical principles, which must be manifested in his conduct, allowing him to clear distinction between the honest and the dishonest.

In this sense, the administrative agent who is invested in public office, and who, taking advantage of the powers conferred on him, for his own benefit or that of others, will incur an act of administrative improbity. The administrative agent must not only comply with the law, but also his actions must be in accordance with administrative morality. This requires honesty, good faith, loyalty and probity, in addition to respect for ethical principles.

Therefore, the new law on administrative improbity brought changes with the intention of ensuring that anyone acting dishonestly, committing an act of administrative improbity, must be punished severely in relation to the sanctions listed in the law.

We will, however, take a brief look at the principles of Public Administration, its definitions, as well as its relations with the maintenance and functioning of the State, the changes brought about by the new law on administrative improbity, and a study on the jurisprudence that deals with a topic of general repercussion, in relation to the news brought by the new LIA. Let's move on to these definitions.

The State and Public Administration

The institution of the State came from the need for man (at first organized in groups) to ensure the maintenance of order through institutions that ensured the constitution of Civil Society. Living in society brings man not only benefits, but also limitations.

The term State (from the Latin *status,us*: way of being, situation, condition), according to the Houaiss Dictionary, dates back to the 13th century and designates the "set of institutions that control and administer a nation"; "sovereign country, with its own structure and politically organized".

The concepts of the State are different and diverse, but it is common ground that it results from an organized society, itself subject to a government, which was created to ensure respect for individual duties and guarantees. The government is the institution responsible for the execution, maintenance, ordering and regulation of the laws constituting a sovereign State.

The State exists when there are three original and inseparable elements: the people, the territory and the sovereign government, whose functions are to legislate (Legislative Power, which prepares the laws), execute (Executive Power, whose function is to execute the laws) and supervise (Judiciary, which applies the laws). They are distinct, independent and harmonious powers (Article 2 of the 1988 Federal Constitution). Therefore, it is worth highlighting that the administrative function is not only the responsibility of the Executive Branch, but also of the other powers, each responsible for the effectiveness and excellence of their functions, constituting a balanced and harmonious system in the exercise of powers.

Public Administration is the set of State bodies, services and agents that seek to satisfy the needs of society, such as education, culture, security, health, among other areas. In other words, Public Administration is the management of public interests through the provision of public services.

According to Meirelles (2012), Public Administration, in a formal sense, is the set of bodies established to achieve the Government's objectives; in a material sense, it is the set of functions necessary for public services in general; in an operational sense, it is the permanent and systematic, legal and technical performance of services owned by the State or assumed by it for the benefit of the community. In a global view, Administration is, therefore, the entire State apparatus preordained to carry out its services, aiming to satisfy collective needs.

The main objective of Public Administration is to meet the needs and demands of citizens, and must be transparent in relation to public management, that is, it must be fair and efficient in the provision of public services (essential services).

The public agent oversees carrying out administrative activities, always aiming for the common good, since the main objective of Public Administration is the public interest, which must be based on constitutional principles: legality; impersonality; morality; advertising and efficiency (Meirelles, 2012). Such principles are listed in the 1988 Federal Constitution (Art. 37, of the CF).

The public administrator is obliged to strictly comply with the law and regulations, since, according to the principle of legality, his acts must be in accordance with legal principles. However, no one will be forced to do or not do anything except by virtue of law (Article 5 of the 1988 Federal Constitution). In other words, you must only do what the law allows, and you must act impersonally, without thinking about your own benefit or that of others, and you must perform acts in favor of the collective, the common good (principle of impersonality), always aiming for gain and Social development.

Regarding the principle of administrative morality, what must be highlighted is that it goes beyond what can be verified about legal dictates. The public agent, as administrator of public affairs, must not only respect the laws, but must also be guided by the rules of good administration, aiming to build a fair society.

The principle of publicity, for example, is one of the principles that guarantees the transparency of public administrative activities. This involves the disclosure of the administrative act, that is, the obligation, on the part of the public agent, to act in a transparent and appropriate manner, through an official press organ, taking some constitutional limits as a parameter. We understand that this principle presupposes the fundamental need to guarantee not only the visibility of the bureaucratic and legal procedures of public administration, but also democratic participation through demands and critical evaluation of society.

Another principle that favors the maintenance of democracy is that of efficiency. According to this principle, one must value the good results of services and rationality, aiming

for the best possible result, considering the authority of actions and administrative acts in compliance with bureaucratic functions, in order to meet the objectives of society.

To guarantee an adequate and correct use of public resources, the Public Administration has inspection and audit mechanisms (Courts of Auditors, for example) so that it can verify and guarantee that public money is being used and employed in an appropriate manner. correct and appropriate. However, currently, it can also count on the participation of citizens, of society, when it comes to decision-making.

The Public Agent and The Administrative Function

To carry out administrative activity, the presence of a public agent is necessary, which is anyone who performs a public function, whether permanent or temporary, paid or unpaid, to meet a public purpose.

Law 14230/21 (Administrative Improbability Law) states in its art. 2nd:

Art. 2 - For the purposes of this Law, public agents are considered to be political agents, public servants and anyone who works, even if temporarily or without remuneration, by election, appointment, designation, hiring or any other form of investiture or link, mandate, position, employment or function in the entities referred to in art. 1 of this Law. *(our translation)*

Like this, “Public agents are all natural persons tasked definitively or temporarily with the exercise of some state function (Meirelles, 2012).

According to Di Pietro (2016), a public agent is any individual who provides services to the State and legal entities in Indirect Administration. Public agents are divided into the following categories:

1. Political Agents

They are those who occupy positions at the first level of the Government, who exercise political and constitutional functions, whose link with the State comes from a political nature, that is, they occupy the positions that make up the constitutional framework of the State (Heads of the Executive Branch, members of the Legislative Branch, members of the Judiciary and members of the Public Ministry). *(our translation)*

2. Public Servant

A public servant is understood as an individual who provides services to the State and Indirect Administration Entities, with an employment relationship and with remuneration paid from the public coffers. This category includes statutory employees, public employees and temporary employees. *(our translation)*

3. Military (art. 142, §3 and 42 of the Federal Constitution) *(our translation)*

Those who provide services to the Armed Forces (art. 142 of the CF): navy, army and air force (§3°), and; the Police and Military Fire Brigades of the States, Federal District and Territories (art. 42). They are subject to their own legal regime (distinct from public servants).

4. Private individuals in collaboration with the Public Authorities *(our translation)*

The individual who provides services to the State, but without an employment relationship (with or without remuneration) is included in this category of public agent (Di Pietro, 2016). *(our translation)*

It is important to highlight the difference between public office and public service, as they are generally and mistakenly confused. The public position (permanent or on commission) is part of the Public Administration, and is an administrative unit, used to fill public bodies, through administrative agents (public servants), who are subject to the statutory regime, with specific functions and remuneration established by law.

For Mello (2015), public positions are the simplest and most indivisible units of competence to be held by an agent. They are created by law, provided for in a certain number and with their own name. The public function, which covers the temporary function and the trust function, is the activity itself, the set of duties, activities intended for public agents (Cunha Jr., 2017). It does not cover either position or employment.

According to the Federal Constitution, in its art. 37, trust functions must be exercised exclusively by civil servants occupying a permanent position, and commission positions, to be filled by career civil servants in the cases, conditions and minimum percentages provided for by law, are intended only for management duties, leadership and advice (Brasil, 1988).

The Administrative Improbability Law – LIA

The word improbity means dishonesty, bad nature, lack of probity, integrity, fairness, being exactly the opposite of probity, which means honesty. It is a term that derives from the Latin *improbitas*, which means poor quality, immorality, and in legal terms it is considered something dishonest, of bad nature and something in bad faith.

Administrative Improbability is understood as “any act carried out by a public agent that violates the fundamental principles of Public Administration, namely legality, impersonality, morality, publicity and efficiency”. This is an illicit action, since, by acting to achieve his own benefit or that of third parties, resulting in illicit enrichment, the public agent generates losses to the public treasury, thus being an infringing attitude.

The crime of administrative improbity harms society in general, as there are sometimes misappropriation of public resources which would bring several benefits to the Brazilian population, as they would be allocated to services considered essential, such as education and health. It is for this reason that the fight against corruption strengthens not only the well-being of society, but also strengthens and enhances our democracy.

Public Administration strives for administrative probity so that the efficiency and legitimacy of public institutions can be guaranteed, since the public agent must act for the benefit of the community (for the benefit of the public interest), not using the position he holds to benefit himself. or to benefit others. Anyone who holds public office must act with integrity and honesty and must carry out their duties ethically and fairly.

Administrative improbity is considered an illegal act, when the public agent, in the exercise of his function, contradicts the Principles of Administration that are established/listed in the Federal Constitution of 1988 (Art. 37), thus causing damage/loss to the public treasury. According to Silva (2020), administrative improbity is an immorality qualified by damage to the public treasury and corresponding advantage to the offender or to others.

The Federal Constitution provides in its art. 37, § 4:

Acts of administrative improbity will result in the suspension of political rights, the loss of public service, the unavailability of assets and reimbursement to the public treasury, in

the form and degree provided for by law, without prejudice to the applicable criminal action (Brazil, 1988). (*our translation*)

The administrative improbity law, Law No. 8,429/92, is considered a significant milestone in the fight against corruption and was created to ensure the integrity of public assets against illegal acts carried out by public agents in the exercise of public functions. This law establishes norms and sanctions to punish the agent causing damage to the public treasury (a public thing), who seeks to enrich himself illicitly, who violates administrative principles, as well as the duties of honesty, impartiality and legality.

The Administrative Improbity Law, also known as LIA, is, therefore, an instrument to defend public assets. Law No. 8,429/92 is the implementation of the Principle of Administrative Morality, as it is a prerequisite for the conduct of public agents, who must not act for their own benefit or that of others. It is applied at the federal, state and municipal levels, thus covering political agents, public servants, as well as legal entities that benefit from the act of administrative improbity.

The improbity law was approved by a majority of votes in the National Congress, and sanctioned as provided for in our Federal Constitution, as it seeks to combat administrative improbity. After 30 years, the improbity law needed to be reformulated so that changes could be made and so that it could adapt to the current reality, thus meeting the desires of our society. Therefore, the “new” Administrative Improbity Law emerged, Law No. 14,230/92, of October 25, 2021.

According to the new wording given by Law No. 14,230/21, one of the main changes brought concerns the extinction of the culpable modality, since, according to the new text of the law, the public agent will only be convicted of administrative improbity due to intentional conduct, that is, he must there is a will/intention to achieve the typified illicit result, the agent's voluntariness alone is not enough (the culpable modality is no longer valid, as provided for in Law No. 8429/92).

Law No. 14,230/21 did not repeal Law No. 8,429/92, but it promoted important and significant changes:

- a) Acts of impropriety through willful conduct;
- b) The Public Prosecutor's Office has the exclusive right to propose an action for misconduct;
- c) Changes to the deadline for sanctions. Deadlines have been increased;
- d) Change in fine values (reduction in values);
- e) Change in statute of limitations (8 years from the date of the act);
- f) Prediction of nepotism as an act of impropriety.

The art. 7th, of Law No. 14,230/21, says that “If there is evidence of an act of impropriety, the authority that knows the facts will represent the competent Public Prosecutor's Office, to take the necessary measures” (Brasil, 2021). (*our translation*)

Although the law recognizes the exclusive competence of the Public Prosecutor's Office to propose action for administrative improbity, in the judgment of Direct Constitutionality Actions, ADIs 7042 and 7043, by the Federal Supreme Court, it was decided that public entities that have suffered losses due to acts of administrative improbity are also authorized to bring administrative improbity action.

The improbity law will be applied to acts carried out against public bodies of any sphere and of any power, as well as carried out in private entities that receive public money. This means that, if there is public money, the law applies. As a rule, the person who commits an act of improbity is a public agent and will be punished by him, as well as the private individual (individual or legal entity) who participated in this act. The Federal Constitution provides in its art. 37, § 4.

If the act of administrative improbity leads to illicit enrichment or damage to the public treasury, it will be up to the authority that knows the facts to represent the competent Public Prosecutor's Office, for the necessary measures (art. 7, of Law nº 14.230/21).

Currently, the damage to public property caused by administrative improbity and misconduct in ethical and moral conduct is one of the most pressing contemporary problems facing the country. Better known as the problem of corruption in institutions, the complexity of this social phenomenon is difficult to address in the few lines of an article, as it is a set of misconduct, fraud and administrative fraud, caused by coordination between public agents and private companies, which, through loopholes in the Law, end up exchanging dividends for illegal acts such as the diversion of financial resources from the public treasury.

The Correlation Between the Law of Administrative Improbity and Legal Pluralism

Before we talk about the correlation between the Administrative Improbity Law and Legal Pluralism, let's understand its meaning. We can say that there is no clear and precise definition of what constitutes legal pluralism, as it arises from the coexistence of different legal systems that are present within a society. Such legal systems can be formal or informal and can be based on customs, religious principles or traditions.

Pluralism can be defined as something that is not unique, but that there can be more than one category or segment, and that can be a legal system that is based on the coexistence of different and independent groups about representation. Legal pluralism results from the existence of two or more legal systems, endowed with effectiveness, concomitantly in the same environment of time and space. There is great uncertainty regarding the concept of legal pluralism. The dissent occurs, initially, due to the lack of a clear and consensual definition regarding what law is and, therefore, which rules should be considered in the spectrum analyzed as law.

Legal pluralism cannot and should not be confused with the absence of order, that is, the legal legal system maintains its authority in certain situations so that public order can be maintained, however it recognizes that different alternative legal systems can exist within a given society. Different communities (indigenous, professional associations, religious groups) can apply these alternative (autonomous) legal systems in parallel to the legal legal system (established by the government).

Being autonomous, alternative legal systems can have their own procedures, creating and applying their own standards so that they can resolve issues of different groups, when the legal system is not capable of meeting the needs of these groups, as they have diverse and distinct needs. Legal pluralism proposes a new path so that not only conflicts can be resolved, but also so that specific norms, particular norms of certain systems or groups (such as religious, community and informal systems) can be validated and recognized. With this, he wants to show that legitimacy is not exclusive and unique to the State in relation to the creation of legal norms, that is, there is the possibility that there are other sources of law for the same legal system.

An important instrument of Administrative Law, the Administrative Improbability Law was created with the aim of combating illegal acts committed by public agents. Law No. 8,429/92, later amended by Law No. 14,230/21, is therefore specific legislation that deals with undue practices (acts of administrative improbity) that are committed by public agents in the exercise of public functions, as such acts can causing harm to the treasury (public property), illicit enrichment, violation of the constitutional principles of public administration (legality, morality, impersonality, publicity and efficiency), undue favoritism of another person.

As it is specific legislation, aimed at combating corruption and mismanagement on the part of public agents, the Administrative Improbability Law strives for probity in administration, that is, it was created to combat mismanagement/administration of public assets by those involved. who is invested in public office, who is responsible for taking care of public affairs, without seeking his own interest or that of others.

When different legal systems approach administrative improbity in different ways, we have a correlation between legal pluralism and the law of administrative improbity, since in some groups there may be a specific rule that even conflicts with the provisions of the law on administrative improbity. However, we can ask which system should stand out, that is, prevail, when there is a conflict between the legal norm and the norm of a given group or community. In this way, we realize that the law of administrative improbity may encounter obstacles to solving problems, since different systems will be in conflict, and how they should be faced and resolved in certain cases and situations. In certain groups, there are their own legal systems, with their own rules so that matters and issues based on cultural traditions, values or principles can be dealt with.

It is necessary, however, to reconcile legal systems so that the protection of rights can be guaranteed, thus guaranteeing justice, and that they are, therefore, in line with constitutional principles, that is, it is essential that there is a balance between the different legal systems so that the fight against corruption and administrative improbity can be guaranteed. The correlation between administrative improbity law and legal pluralism can generate doubts and questions about which system will stand out or prevail in the event of a conflict of laws.

If applied within a context of pluralism, the law of administrative improbity may face some challenges regarding the responsibility and punishment of public agents, as there may be differences between the legal legal system and the alternative legal system. So that we can better understand this correlation, we take as an example the context of indigenous communities, since even over time, over the years, the manifestation of indigenous rights has survived within the remaining populations, being respected, maintaining it. if so, their cultural identity, about legal pluralism, as they have their own legal systems. Such legal systems are based on indigenous customs, as well as the conduct of their members.

Considering the cultural diversity existing in the country and the perspective that the concept of culture encompasses social, mythological, religious, symbolic, legal aspects, etc., it is recognized that each society, including indigenous ones, has its own ways of expressing and translating the reality around you.

Even though it has its own mechanisms to hold indigenous agents responsible for committing an improbable act, which violates the principles established in the law of administrative improbity, even though their rights are guaranteed in the Federal Constitution of 1988, the official legal system can act to ensure that the application of the law is necessary, thus ensuring the maintenance of justice.

Theme 1199: New Rules on Administrative Improbability

Theme 1199, a topic of general repercussion, judged by the Federal Supreme Court (STF), deals with matters relating to the changes brought by the Administrative Improbability Law No. 14,230/21 (deals with the definition of possible (IR)RETROACTIVITY, regarding the retroactivity of law, the removal of guilt and the jurisdictional prescription (general and intercurrent). The issue was judged quickly, in a short space of time, and with this the following theses were established:

- 1) Proof of subjective responsibility is necessary for the classification of acts of administrative improbity, requiring - in art. 9, 10 and 11 of the LIA - the presence of the subjective element - DOLO;
- 2) The beneficial rule of law 14.230/21 - revocation of the culpable modality of the act of administrative improbity - is IRRETROACTIVE, by virtue of art. 5, item XXXVI, of the Federal Constitution, having no impact on the effectiveness of res judicata; nor during the process of executing the sentences and their incidents;
- 3) The new law 14.230/21 applies to culpable acts of administrative improbity carried out during the validity of the previous text of the law, but without a final and unappealable conviction, due to the express revocation of the previous text; the competent court must analyze possible intent on the part of the agent;
- 4) The new statute of limitations provided for in law 14,230/21 is IRRETROACTIVE, with the new time frames applying from the publication of the law.

As provided for in Law No. 8429/92, the act of administrative improbity no longer includes the culpable modality (the culpable modality becomes atypical, since only acts of administrative improbity constitute intentional conduct that is typified in articles 9, 10 and 11 of the law), that is, for the act to be considered unlawful, it is necessary to prove intent, and to prove that the public agent acted with the intention of obtaining advantages (acts consciously with the intention of committing an act of administrative improbity), thus harming the public interest, thus violating the principles of Public Administration.

The revocation of the culpable modality does not apply retroactively, that is, anyone who has already been convicted by final judgment for an act of culpable improbity, based on the previous law, will not benefit. The Federal Supreme Court (STJ) understood that the legislator did not make a mistake in removing the culpable modality, since in view of administrative probity it could be considered unconstitutional to withdraw/remove such modality, as it was feared that the legal interest would be left unprotected in this way. If the case becomes final and unappealable under the terms of Law No. 8,429/92, there will be no rescission action or criminal review, the public agent will be considered guilty and must serve the sentence. Therefore, if you have not yet been convicted by final judgment (in compliance with the principle of res judicata guaranteed by the Constitution), you may benefit from the new law. Law No. 14,230/21 clearly states that the principles of sanctioning law apply to the law of administrative improbity. The law should not be retroactive to cases with final decisions and processes that are in the execution phase of sentences. It is important to emphasize that the Federal Constitution provides for the retroactivity of the most beneficial criminal law, therefore, sanctions resulting from the commission of an unlawful act should not be confused.

Regarding prescription, the new law on administrative improbity established a new prescription regime, as in the previous law there was no intercurrent prescription, but rather a general prescription (date of the fact until the filing of the administrative improbity action), that is, in general prescription, the initial term occurs when the fact occurs. In the previous

law, the statute of limitations was 5 years (more beneficial), and with the new law the period was increased to 8 years, with no retroactivity under the new law. Therefore, the shorter the period, the better for the offending agent, and the longer the period, the better for the State.

In the old law, the counting of the general prescription began with the Public Prosecutor's Office, by the public entity, becoming aware of the fact. However, currently, the statute of limitations begins to run from the date of the incident. In the case of a political agent, the term will begin to run from the end of the mandate. What has changed is that, once the event occurs, the deadline begins to count. After the action is filed, there is a period of 4 years to complete the first milestone, which is the sentence, and, if there is no sentence within this period, the period will be prescribed. If the sentence is acquittal, that is, if the defendant is acquitted, it does not interrupt the term.

The change (and great novelty) brought about by the new law was the establishment of the intercurrent prescription, that is, during the administrative improbity process, the prescription may be recognized due to inertia regarding the investigation of interruptive milestones. The interruptive milestones established were the following: filing of the administrative improbity claim; sentencing sentence; publication of a decision or ruling of the Court of Justice or Federal Regional Court that confirms the conviction or reforms the ruling that the request is unfounded and publication of a decision or ruling of the Superior Court of Justice that confirms the conviction or that reforms the ruling that is unfounded.

The Federal Public Ministry supports the debate that the rules regarding prescription would be prospectively effective and not retroactively effective, as they have a mixed nature (material law and procedural law), stating that intercurrent prescription would be unconstitutional.

Final Considerations

Over the years, the concern with combating corruption has been a recurring issue, and for this reason it was necessary to create a standard that would regulate this issue, the Administrative Improbity Law, which in turn became a valuable and important instrument legal system so that we can combat not only corruption, but also mismanagement in the public sector.

As a result, in addition to the Federal Constitution of 1988 and the “new” Administrative Improbity Law, Law No. 14,230/21, the jurisprudence of the higher courts works to combat acts of administrative improbity. On June 2, 1992, Law No. 8,429/92 was created with the aim of moralizing Public Administration, later undergoing changes through the “new” Administrative Improbity Law, Law No. 14,203/21, so that it could be adapt to the current social and political context of the country: extinction of the culpable modality, change in procedural deadlines and the exclusive competence of the Public Prosecutor's Office to propose administrative improbity action (Therefore, in the judgment of the Direct Constitutionality Actions, ADIs 70742 and 7043, by the Supreme Federal Court, it was decided that public entities that have suffered losses due to improbable acts are also authorized to bring administrative improbity action).

Therefore, the application of the improbity law faces some problems, such as the lack of structure to effectively investigate and punish agents who commit improbable acts, but also the slowness of justice in judging such actions of administrative improbity. Over time, society's interest in the misuse of public resources has grown, however, the State has demonstrated inefficiency in combating acts of administrative improbity.

The State has the obligation to ensure that agents causing damage to public property are punished strictly in accordance with the law, however, administrative morality is increasingly affected by the practice of improbable acts, as there is no effective supervision by the of the State, in favor of the common good, thus preserving public affairs.

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DIFFERENTIALS OF THE COOPERATIVISM IN THE CONTEXT OF THE CORONAVIRUS PANDEMIC

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Introduction

The motivation for this study arose in the midst of the pandemic caused by the Corona virus (Covid-19), which has changed the economic and social scenario in recent months, affecting the lives of the world's population as a whole. The impact of this pandemic has brought about a number of changes in the most diverse sectors, both nationally and internationally. Technology has advanced in this segment, new forms of service have been adopted and a new perception of business and importance has been generated.

For the business world, the pandemic has severely affected, in this context many companies have closed their activities or have had to adapt to remote work, decreased revenues, losses and other challenging situations (Deloitte, 2020). According to SEBRAE (2020), 31% of companies changed their operation and 58.9% stopped their activities temporarily in 2020.

The socio-economic impacts caused by the pandemic generated a demand for answers from the government and also from financial institutions, which led to the search for immediate solutions for the survival of business activities. According to the Portal do Cooperativismo Financeiro (2020), in the search for rates and credit facilities, credit cooperatives have shown themselves to be simpler, fairer in rates, easier to acquire credit, institutions that are concerned with an effective financial service and healthy and sustainable credit for their members.

Faced with the pandemic scenario, in which social isolation is the main strategy, many companies have had to close down or temporarily interrupt their activities, directly affecting the reduction or non-receipt of income. At a time when it was difficult to meet their commitments, companies sought out financial institutions. In view of the above, the following is the problem: Differences between cooperatives and the coronavirus pandemic.

Theoretical Reference

Cooperatives began in England, in Rochdale, Manchester, in the 19th century, with the founding of the Rochdale Society of Probable Pioneers. Consumer cooperatives were set up in 1844, when weavers pooled their resources to start this process, as they were facing an industrial crisis and the aim was to provide food at fair prices. In France, at the same time, the production cooperative movement began, and in Germany credit and consumer cooperatives were set up (Polonio, 2001).

Cooperativism is a social and economic movement between people, considering them as associates, seeking to economically achieve the common good and promote social reform within capitalism. Through cooperation, the aim is to solve common problems and satisfy needs. It's not just about profit, it's about people.

A cooperative organization is characterized by participatory and democratic management, based on the wishes of its members.

According to Pagnussatt (2004), in 1995 the ICA Congress in Manchester redefined the basic universal values of cooperativism and its principles through the worldwide cooperative movement. The universal principles and values are seen as a guideline, as each cooperative seeks to establish its own basic principles and values.

"Cooperativism is an economic system whose principles guide cooperative organizations and their activities of production and distribution of wealth, with the aim of achieving full economic and social development." (Buttenbender et al., 2011, p. 50).

According to Santos (2008), there are some principles that govern cooperativism:

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- a) Democratic control by the members;
- b) Participation in the economic results of its members;
- c) Independence and autonomy;
- d) Training, information and education;
- e) Cooperation between cooperatives;
- f) Commitment to developing the community;
- g) Free and voluntary membership.

Concepts of Credit Cooperativism

In order to expand access to credit, financial products and services, with the aim of promoting income, work and social inclusion for the general community, the government has been providing opportunities for credit cooperatives to operate (Pagnussatt, 2004).

Credit unions comply with all the legislation and rules of the financial system. They can originate from an association of people or professionals from a certain segment or even adopt the free admission of members in a given area of activity (Newlands, 2011).

According to the Central Bank of Brazil (2021), cooperatives' profits from providing services and credit to their members are shared among their members, in accordance with each cooperative's articles of association. They must have a minimum of 20 members and may not use the word "Bank" in their nomenclature, only the expression "Cooperative". In addition, they are authorized by the Central Bank to carry out operations only for their members.

Credit unions are partnerships, formed to offer and provide services to members, with the aim of defending and promoting the economy of each member individually and with their own particularities, differing from other companies due to the constitution of their capital, decision-making process and distribution of results. They are part of the National Financial System (SFN), their operation is authorized by the Central Bank of Brazil (BCB) and their status is linked to monetary financial institutions (Schardong, 2003).

Credit cooperatives serve all economic and social classes, strengthening the economic and financial education of their members. The funds raised by cooperatives are invested in the community and the resources remain local, thus promoting the strengthening of the cooperative spirit. (Portal do cooperativismo, 2015).

According to the Central Bank of Brazil (2021), generally when an individual or legal entity joins a credit cooperative, it spends an amount to pay up the cooperative's share capital, thus making the free association to the system effective, thus having the rights and duties of a credit cooperative member. In addition, members have the power to vote regardless of their shareholding. Credit cooperatives are not profit-driven and membership is free and voluntary.

In addition, according to the Central Bank of Brazil (2021), credit unions also seek to get closer to the community through social programs, encouraging their regions to learn more and more about cooperativism, not just their members.

Methodology

Research can be carried out using two methods: qualitative and quantitative. Quantitative research is based on a large number of facts, seeks clear evidence and has a statistical study; qualitative research uses small samples and is concerned with the veracity of data and the sum of information that can be used (Malhotra, 2001).

For Guerriero (2006), qualitative research encompasses not only its intentions, but also social change. Social change can happen through critique and the discovery of subliminal explanations to

the system of coercion, the encouragement of those involved and communities. As a result, the tactics created after the qualitative research are manifested in the data and its theory is built on them.

In view of the objectives set for this work, there is a need to refine the issue of cooperative differentials in the midst of the coronavirus pandemic. In this way, the aim of the work is not just to understand cooperative differentials, but what can be taken into account from the three current cooperatives in Brazil and their actions in the midst of the pandemic. Thus, it is more pertinent to use qualitative research, as research and analysis will be necessary in order to obtain more in-depth knowledge of the subject, so that, after the information collected from the cooperatives studied, knowledge of the experiences can be obtained, making it possible to point out the cooperative references that make a difference in society.

This research can be classified as qualitative in nature and exploratory in terms of its objectives. According to Gil (2010), in terms of objectives, research can be explanatory, descriptive or exploratory. Exploratory research seeks to increase knowledge about a subject or proposed theme, thus establishing hypotheses or acting in such a way that the issue is more clearly explained.

With the aim of understanding the proposed subject, cooperative differentials in the midst of the coronavirus pandemic, the research is exploratory, because in addition to the authors mentioned, Gil (2010) explains that it will bring the researcher closer to the problem, seeking to make it easier and clearer to understand, explain and change thoughts and concepts.

According to Sordi (2013), a research strategy is understood as a systematic method for solving a study problem. When determined, a strategy also establishes a group of standardized processes to be followed by the explorer, based on the prior logic of the given strategy. The strategies used to achieve the desired objective in this project were through primary information, namely bibliographical and documentary.

In order to achieve the objective of this research, the financial market and what the banking sector encompasses were studied, starting at the base to clearly understand the services and purposes that a bank has, in order to later understand the cooperative differentials. According to Gil (2010), both bibliographical and documentary studies use data that already exists. The difference between them is that bibliographical studies focus on reaching a specific reader, while documentary studies are created for different purposes.

Documentary research, according to Vergara (2010), is carried out by reading publications that are accessible to the community in general, making it possible to identify them in magazines, physical and virtual books, newspapers, the internet in general, this study may be exhausted, but it can also be used as support and analytical material for other research that may be carried out.

In order to achieve the aim of the study, it was necessary to use case studies as a strategy, in addition to bibliographical and documentary research. According to Vergara (2010, p. 49), a case study is: limited to one or a few units, understood as a person, a family, a product, a company, a public body, a community or even a country. It is in-depth and detailed.

Silva & Menezes (2001) define a case study as an exhaustive and in-depth involvement by the researcher, with one or a few objectives, but which enables a broad and detailed understanding.

Overall, the study seeks to provide answers to the general objective of this research, which is to understand the cooperative differentials in the midst of the coronavirus pandemic, and to analyze the advances that these credit unions have made.

Data Collection Process

Obtaining data is linked to the difficulty of the investigation, the questions, hypotheses and the purpose of the research. Furthermore, it determines the possible ways of organizing and displaying the methodology and statistical data that will be used to understand and verify the data (Farias Filho & Arruda Filho, 2015).

According to Marconi & Lakatos (2003), the process of searching for data is the moment in the research when the instruments produced and the techniques chosen to collect the expected data

begin to be used. Strong control over the application of the research instruments is a fundamental factor in preventing mistakes and errors resulting from interviewers who lack experience or from biased informants. The authors go on to say that there are numerous procedures for carrying out data collection and these change according to the choice of investigation and the characteristics of the research. Generally speaking, research techniques can include: document collection; interviews; observation; forms; questionnaires; measures of attitudes and opinions; marketing techniques; life history; sociometry; content analysis; tests.

In order to achieve the objective of understanding the cooperative differentials in the midst of the coronavirus pandemic, the search for information was secondary, through bibliographies, case studies and theoretical background.

In short, in order to achieve the objectives of the work, it was necessary to carry out bibliographical research and also documentary research in relation to the differentials of cooperativism that have emerged or stood out since the coronavirus pandemic.

Process of Data Analysis

According to Marconi & Lakatos (2003), at this stage of the project the results are transcribed, offering evidence for the affirmation or rejection of the hypotheses. Tables, graphs and statistics can be used in order to better understand the information and data obtained. For Gil (2010), understanding the data is one of the most important moments of the report. At this stage, the broader meaning obtained is sampled, linking it to other knowledge already acquired.

According to Marconi & Lakatos (2003), when it comes to analyzing and interpreting the data and information, the researcher needs to consider two aspects: a) the research plan needs to be very well prepared, thus helping with understanding and interpretation; b) coherently addressing the hypotheses or problems, whether they are simple or more complex.

Once the information has been collected and organized, it is the researcher's responsibility to understand what it means or to explain the links between the facts obtained and the ideas put forward. In this logic, data preparation encompasses everything from the administration of the information collected, its treatment, to the study and understanding of the information (Rodrigues, 2007).

Klein (2015) says that the most common data analysis strategies include: analytical descriptions; qualitative comparisons; content analysis; discourse analysis; and concept maps.

Data can be analyzed in two ways: statistically or non-statistically. In this qualitative research, the aim is to understand the situation being researched without the intention of quantifying the data obtained through statistical means, which is why the data in this study was analyzed using content exploration (Vergara, 2010).

According to Michel (2015), content analysis is known as a strategy for ascertaining data through interviews, texts, conversations and information that has already been obtained, meaning that the study is carried out after the data has been collected. It is particularly suitable for analyzing personalities, texts, messages, expressions and literary works. In the course of trends, it confronts, opines and measures the clarity of messages, patterns and the media. Through content analysis, the aim is to carry out a more detailed analysis of the message (content and expression), to ascertain whether or not the reality of the text is coherent. The author goes on to say that content analysis is a difficult and quite thorough task in practice, as it requires a degree of maturity on the part of the researcher, as it results in invalid data if it is misinterpreted, if it contains false value judgments, manipulations or pre-judgments.

RESULTS

This section presents the results of the study, through the application of bibliographic and documentary research strategies, studying three credit unions. It aims to answer the research problem: "What are the differentials of cooperativism that have emerged or stood out since the coronavirus pandemic?". Also, to list results for the specific objectives, which are: to identify and analyze the importance and representativeness of credit cooperatives for the Brazilian and world economy; to identify the growth of credit cooperatives since the pandemic; to identify the reasons for the growth of credit cooperatives since the pandemic; to identify what are the differentials, benefits, advantages of cooperativism that have emerged or stood out since the coronavirus pandemic.

Importance and representativeness of credit cooperatives for the brazilian economy

Credit cooperatives have evolved and grown in numbers in Brazil, and have also created awareness campaigns aimed at the well-being of the entire community.

Their participation in credit operations has been growing steadily. In recent years, credit unions have been the fastest growing and most prominent in the National Financial System (SFN). Between 2016 and 2020, this sector represented 2.74% of the SFN, rising to 5.1%, from R\$95 billion to R\$228.7 billion.

In 2020, rural credit was the most requested credit in credit cooperatives for individuals, accounting for 36.9% of concessions. This was followed by payroll loans and non-payroll loans, with a 30.3% share.

The role of credit cooperatives in the agribusiness segment is very significant and of paramount importance, since this segment represents one of the country's largest GDPs (Gross Domestic Product), even with the economic crisis in 2020. This type of credit accounted for 20.26% of all rural financing in the SFN, compared to 9.5% in 2016.

The Central Bank states that, "The analysis indicates that there is still room for credit growth in the sector - either by expanding the relative share of credit taken out by its members in the SFN, or by maintaining the expansion geographically" (Barbosa, 2021).

In Brazil, there are already 11.9 million members in 847 cooperatives, basically linked to the credit system, totaling around R\$ 371.8 billion in total assets, based on the Panorama of the National Cooperative Credit System (SNCC) in 2020. The growth of cooperativism in Brazil has brought many benefits, based on a study carried out by FIPE - Fundação Instituto de Pesquisas Econômicas - which analyzed data and information from all Brazilian cities with and without credit cooperatives between 1994 and 2017 and crossed the information with IBGE - Instituto Brasileiro de Geografia - and the research found that credit cooperatives increased the per capita GDP of cities by 5.6%, received an additional 6.2% of formal job vacancies and increased the number of commercial establishments by 15.7%, stimulating local development and entrepreneurship (Caldas, 2022).

According to Caldas (2022), credit unions are entering smaller towns with a GDP of R\$79 million or more, while public banks are looking for a minimum GDP of R\$146 million, and private banks are looking for a GDP of over R\$220 million. In comparison, credit unions serve less banked regions, i.e. they also seek to be present where other banks have no interest in being physically present.

Thus, credit cooperatives have expanded their numbers, their presence and their operations in Brazil, have grown and have been recognized and integrated into the SFN, and have maintained their essence, principles and values. Its differentials have made it grow in Brazil and, according to the data and information, it still has a lot of room to grow and advance.

Importance and representativeness of credit cooperatives for the world economy

With their collaborative approach and valuing the community, cooperatives are showing their strengths around the world and highlighting the emergence of new economic trends, with some of the most prominent and powerful themes being: sustainable economy, basic income projects and technological advancement, representing a great opportunity for the sector (MUNDOCOOP, 2020).

It is a global cooperative movement. Cooperatives operate in over a hundred countries, supporting communities and their members.

Cooperatives are a major trend in the world, and the model has emerged as a new option to traditional banking models. According to a report by the World Council of Credit Unions, cooperatives are present in more than 118 countries, bringing together more than 274 million members and exceeding US\$ 2.19 trillion in assets (Caldas, 2022).

A more recent record showing the growth of credit unions, analyzed by the World Council of Credit Unions, shows that the segment has more than 375 million members and 86,000 credit unions in 118 countries. In percentage terms, the penetration rate is 12.18% worldwide, 16.47% in Latin America and 8.13% in Brazil. In Canada and the United States, the rate is 42.20% and 58.6% respectively. For these calculations, the total number of credit union members was divided by the economically active population aged between 15 and 64 (Caldas, 2022).

The objectives of credit cooperatives everywhere in the world are to have an impact on the community, to apply and develop resources in the region where they are located, to develop the community in a sustainable way, among other approaches that cooperatives value (Portal Do Cooperativismo Financeiro, 2016).

More mature economies already use cooperatives as an instrument to boost strategic economic sectors. The main examples are found in Europe, especially in Germany, Belgium, the Netherlands, Portugal, Spain and France. The Canadian, American and Japanese experiences are also noteworthy (Coop, 2016).

In Canada and Ireland, cooperativism has been taking hold, with efficiency and seriousness, traditional banks have left the sidelines and credit unions have been working and managing to keep jobs in small communities and providing products and services that are better suited to local needs. (COOP, 2016).

According to COOP (2016), of the 50 largest banking systems in the world, 6 of them are cooperative banks. This shows that cooperativism is already present in many parts of the world, with significant representation in some countries and regions. However, it still has a large market to explore and reach regions where cooperatives are not yet as active.

Growth of Credit Unions Since the Pandemic

According to R7 (2021), the COVID-19 pandemic has affected many families, generating unemployment, reduced income, workload adjustments and health restrictions that have made it impossible for professionals to work in the pandemic. As a result, the demand for credit in credit unions went from 11,943,267 credit operations in May 2020 to 13,355,024 operations in May 2021. This is an increase of 1,441,757, representing 11.82%.

Credit granted to individuals in this period rose from 10,254,140 to 11,378,694, an increase of 10.97%. And for legal entities, from 1,689,127 to 1,976,330, an increase of 17% (Martins, 2022).

Credit unions have 7,500 branches across the country, 11.9 million members and 71,700 employees. With the growth of cooperatives in recent years, they intend to open 1,300 new branches and provide 13,000 new jobs in Brazil by 2022. Unlike traditional banks, which are closing their branches, cooperatives are consolidating their position as the largest financial services network in the country (Martins, 2022).

According to the Central Bank of Brazil (2021), one of the factors that has boosted credit cooperatives is the strong link with the agricultural sector. The GDP (Gross Domestic Product) of agribusiness has grown, even with the economic crisis, credit cooperativism has evolved, and in 2020

it represented 20.26% of all rural financing in the SFN, which is a good advance, compared to 2016 when it represented 9.5% (Banco Central Do Brasil, 2021).

Historically, studies have shown that credit unions have weathered crises in a different way to traditional banks, as they can reduce or soften the negative effects caused. For example, in Brazil in 2020, companies that sought funds from credit unions had greater success with rates than those that sought them from the banking system (BCB, 2021).

The capillarity of credit unions provides opportunities of different kinds, from PIX transactions to payments to credit lines. Cooperatives currently account for 10% of the country's financial sector, with the Central Bank aiming to double this figure in a short space of time (Martins, 2022).

In Brazil, the concentration of income is quite embarrassing, with the richest 1% owning 28.3% of the country's income, based on a 2020 report by the United Nations Development Program (UNDP). Cooperativism seeks to structure a fairer model in communities, retaining resources for local development and distributing its financial results proportionally to each member (Martins, 2022).

As you can see, cooperatives are looking to expand and have played a key role in the pandemic, growing and conquering even more markets, which will make a big difference in the post-pandemic period too.

Reasons for the Growth of Credit Unions Since the Pandemic

During the pandemic, many banks reduced the number of physical branches and greatly expanded digital media and self-service. Cooperatives have also gone digital and promoted the use of electronic channels, but at the same time they have invested in expanding and improving their branches. The growth of cooperatives in recent years shows that the strategy is working and that the path is right. One example is the total SNCC (National Cooperative Credit System) deposit, which grew by 42.56% in 2020 compared to 2019 (Santos, 2021).

Differentiated service is a key point in the growth of credit unions. According to Santos (2021), low-cost and efficient service is achieved through technology. Currently, more than 80% of credit union transactions in Brazil are carried out electronically and digitally. As a result, service will increasingly be machines talking to machines, but humans will be indispensable and irreplaceable for relationships.

Branches with a good structure are a great start to strengthening relationships, as they are able to feel and understand the needs of each member, delivering products and services that make sense to them. By building loyalty, the cooperative gains a foothold as the member's financial agent (Santos, 2021).

Having physical branches is a very competitive strategy, especially in the long term, because the branch is not just a sales channel, but rather, it marks the physical presence of the brand and the commitment to the community and local development (Santos, 2021).

According to Santos (2021), another factor that has made credit unions stand out is their involvement in social, cultural and educational projects. Members feel that they are part of these actions and making a difference in the community, thus attracting even more members to credit unions.

One factor that differentiates credit unions in the pandemic is the interest rate they charge. According to Neiva (2020), the interest on credit operations for small and medium-sized entrepreneurs is on average 20% lower than traditional banks. In addition to the interest rate factor, the lower bureaucracy in credit operations by cooperatives, because in a pandemic traditional banks tend to be more conservative (Neiva, 2020).

Credit unions are in many small municipalities, and this is a differentiating factor, because in many locations traditional banks are not installed. With the pandemic, there was a reduction in

working hours, some closed environments, and having an open service unit giving support and support in the financial life of each citizen, made all the difference (Neiva, 2020).

Based on the information collected, the main reasons why credit unions developed were: Physical and open branches in the pandemic, providing all the necessary support for members; credit lines with lower interest rates than traditional banks, making life easier for members at a time of crisis; humanized service and regional development; branches in cities without banking service units; and reducing bureaucracy in service and credit operations.

Differentials, Benefits, Advantages of Cooperativism that Have Emerged or Stood out Since the Corona Virus Pandemic

The new coronavirus pandemic has required the world to adapt, and safety measures have been taken to control and combat the virus. In the midst of a complicated environment of concern and attention, the differentials of cooperativism stood out (Suzin, 2020).

The cooperatives were innovative and responsible, as they supported vulnerable sectors by creating specific opening hours for those at risk (Suzin, 2020).

The campaigns created to support local commerce and entrepreneurs was a great differentiator of support, as it created an engagement and dissemination of the idea of consuming in local commerce, strengthening the economy and sustaining jobs and families (Suzin, 2020).

One of the great differentials of cooperatives in the midst of the pandemic was access to credit for micro and small businesses.

The success rate is reflected in the growth of the cooperatives' credit portfolio, as mentioned throughout this paper. A study carried out by Sebrae found that 57% of small businesses had not obtained financing, 25% were awaiting responses and 18% had their request granted (Melles, 2020).

One explanation for why cooperatives make the process easier than traditional banks is precisely because of the essence of cooperativism, focusing on regional development and generating shared values with their members. They offer products and services like other financial institutions, but with the differential of fair prices, simplicity, more advantages and less bureaucracy, following the rules of the Central Bank and preserving the solidity of the cooperative (Melles, 2020).

Cooperatives strive for good service and relationships with their members, and this brings them closer and better acquainted with their members and companies, making it easier to assertively release credit and offer products that make sense for the member (Melles, 2020).

There are many differentials and advantages that cooperatives have, but the ones that stood out the most during the pandemic were: physical branches; lower interest rates; close and humanitarian service; and the regional development of communities.

The main objective of this work was to identify and understand the differentials of cooperativism in the Corona Virus pandemic. It can be said that the information gathered, exposed in the work and analyzed collaborated in a relevant way to know and understand cooperativism, the representativeness of credit cooperativism and the main differentials of this sector.

At first, bibliographical research was used, focusing on the financial market in general and cooperativism, with all the concepts exposed in the research being of profound relevance. In order to achieve the general objective proposed in this work, exploratory qualitative research was carried out.

After collecting the data, the information and case studies of each credit union were grouped together and presented, which helped to achieve the specific objectives of this research: identify and analyze the importance and representativeness of Credit Cooperatives for the Brazilian and world economy; identify the growth of cooperatives since the pandemic; identify the reasons for the growth of credit cooperatives since the pandemic; identify what are the differentials, benefits, advantages of cooperativism that have emerged or stood out since the Corona Virus pandemic.

Through the first specific objective, it was possible to identify that credit unions are on the rise in Brazil and worldwide. Cooperatives have more than 375 million members globally, a

percentage of 12.18% penetration in the world, and in Brazil it represents 8.13%. Cooperatives are very important, as they influence the growth of GDP, the development of communities, the release of credit and support for local development, and cooperatives have many market opportunities to further leverage their results.

The second specific objective pointed to the positive result that credit unions have had during the pandemic. From May 2021 to May 2022, there was an 11.82% increase in demand for credit at credit unions. In relation to credit operations, in the same period there was a 10.97% increase in credit granted to individuals, and 17% for legal entities, showing the leverage in the pandemic period.

The third specific objective mentions the reasons for the growth of credit unions in the pandemic, and this was mainly due to the differential in service, as the branches remained open to provide full support to members. In addition to the humanized and close service, the cooperatives work with fairer rates than the market, with less bureaucracy in credit operations, have leveraged technology to better serve their members, and thus stand out even more, even in a difficult and delicate time.

And the fourth specific objective is the advantages, differentials and benefits that have stood out during the pandemic. In addition to the main reasons presented, which were also of great differential in the pandemic, the cooperatives worked with local consumption campaigns, to encourage commerce in their cities, they also focused on social actions, helping local entities and hospitals, they sought even more to support the community in this difficult phase. Customer service once again stood out, as they saw the needs of each member, managed to find solutions and products that really made sense for each one, with fair prices, agile and unbureaucratic.

In order to achieve the objectives set out in this paper, we used secondary sources such as case studies, bibliographies, publications on websites and other media.

The results obtained through research into the three cooperatives mentioned in this paper provide a basis for understanding their trajectories, numbers, differentials and ways of operating.

The credit unions studied have years of experience in the market and have gained many members. The cooperatives are in a positive scenario, as the figures show their leverage, and they are also looking for more space, placing physical branches in cities they don't have yet, and investing heavily in physical and online service. In general, there is a lot of competition in the financial system, and other institutions are also looking for more market share and working on strategic and aggressive plans. As a result, it is necessary to maintain the essence of cooperativism, keeping the member at the center and focused on the business, having strategies for attracting members, and keeping those who have members close and satisfied.

It can be concluded that the research has a consistent base of data and information, being able to identify the cooperative differentials in the midst of the Corona Virus pandemic, so that credit unions can continue to execute their strategies and intensify to conquer even more market and new members.

Through this study, it was possible to analyze the data of three credit unions, the representativeness of cooperatives in the financial sector and their differentials. It is believed, therefore, that it served to identify important points for cooperatives to continue to do their work and advance in the SFN.

Through the bibliography, it was possible to get to know the financial market better, understanding how Brazil's national financial system works. To learn about the theories of cooperativism and the achievements it has already made, as well as the specific objectives proposed in this work.

As for the theoretical implications, the researcher of this work missed interviewing the directors of the cooperatives, to understand the difficulties they face on a daily basis, to know their future plans and their internal strategies for managing to grow and stand out with so much competition and access to information in the financial sector.

Based on the analysis presented in this research, future studies are proposed:

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a) At a global level, a more in-depth study of how the world's largest cooperatives work and the strategies they adopt;

b) To study countries where cooperatives are more widely accepted, in order to understand the culture and strategies used.

Cooperativism has many differentiating features, as seen in the course of this work, and suggestions for future work make sense in order to advance and learn even more about the cooperative world.

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THE ROLE OF THE STATE IN CRITICAL LEGAL THEORY

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Abstract

The Critical Theory of Law develops from politicized approaches to legal issues, considering Law in its socio-political aspect and its historical role as an instrument for maintaining hegemonic orders. This line of theory is characterized by reflecting on the internal contradictions of modern society and by being a political movement that proposes reformulating the legal structure that sustains this scenario. In the field of legal science, there is resistance to the politicized critical discourse that turns to the production of knowledge. This article seeks to provide an analysis of critical theorizing in the legal field, considering its theoretical and epistemological assumptions, with the aim of reflecting on scientific production by bringing Law and Politics closer together.

Keywords: Critical Theory of Law; Policy; Emancipation.

Introduction

This article seeks to analyze the Critique of Law, or Critical Theory of Law, which stands out for its different theoretical movements, all of which share a common concern: to understand "the way in which law creates systems of classification and hierarchization, norms and images, which condition or even institute power relations in society", as Hespanha (1997, p. 224) observes.

According to Hespanha (1997, p. 225), the most important theoretical-critical movements in law made significant progress, especially in France (Critique of Law), the United States (Critical Legal Studies) and Germany (Rechtskritik). These influences were disseminated to various countries, acquiring different epistemological nuances. However, by highlighting the division proposed by Hespanha (1997), we are not ignoring the emergence of other movements in European or Latin American countries.

The Critical Theory of Law arises in contemporary society through "politicized approaches involving legal issues, considering Law in its macro socio-political aspect and its historical role as a tool for maintaining hegemonic orders" (Ansari, 2024, p.1). In this context, Ansari (2012, p.1) observes that "criticism of the Law inevitably corresponds to criticism of the status quo of the political order that structures society, falling within the field of demands for changes that go beyond the legal sphere".

In the field of legal theory, there are various reactions to politicized critical approaches to the production of knowledge. So this resistance in the scientific sphere ends up demonstrating numerous important obstacles to the consolidation of critical studies, as a theory, in a more specific perspective - acting from the negation and non-acceptance of traditional legal science, which presents itself as both a political movement and a legal study.

However, the contribution of critical thinking to the ongoing changes in the development of knowledge in the social and legal fields is undeniable (Ansari, 2012, p. 1).

In this context, considering the importance of critical thinking for building fairer and more egalitarian structures, this article seeks to reflect on the theoretical assumptions of critical theory in the legal sphere, especially with regard to the state. In more detail, the aim is to discuss the possibility of integrating Law and Politics, taking into account the limits between Legal Science and Political Science, with the State as the central point of this analysis.

In order to deal with this discussion, the bibliographical review method will be used, through which articles, books, magazines and periodicals will be sought that shed light on the subject under analysis, thus providing a greater understanding of the issue raised here.

Critical Theory of Law

The context of Critical Legal Theory emerges from a politicized discourse in which law is understood as a political instrument. Those who adopt this political-theoretical view argue that the logic and structure of law are products of a superior position in society, protecting its own interests by maintaining order, to the detriment of oppressed segments. Thus, law, as a social instrument that does not respond to objective realities, becomes a legitimizer of social injustices. In modern, Western and capitalist society, the law acts as a political mechanism of oppression (Douzinas, 2009).

Based on the Critical Theory of the Social Sciences, the Frankfurt School and the American civil rights movements of the 1960s, critical thinking in law emerged around 1972. This movement focused on reflecting on and denouncing the inconsistencies present in the model of modern society, establishing itself as a political movement in itself and proposing a reformulation of the legal framework that supported this scenario (Wolkmer, 2012). Along the same lines, various other critical approaches have emerged, such as feminist, racial and post-colonial theory. These positions aim to highlight the oppressed groups in society, using methods and approaches that vary in terms of radicalism, such as deconstructivism, semiotic, systemic and dialectical analysis.

Critical thinking is developed through a transversal approach, cutting across legal, sociological, political, philosophical, psychoanalytical and economic theory. In this way, it distinguishes itself by proposing a critical approach to law, integrating it with other disciplines in the human sciences. The aim is not to turn law into a sociological or psychological discipline, but to adopt a transdisciplinary perspective in the production of knowledge, while maintaining a focus on the legal discipline.

In the field of law, critical thinking was consolidated by proposing "investigations that demystified traditional dogmatic legality and introduced socio-political analyses of the legal phenomenon" (Wolkmer, 2012, p. 42). The Critical Theory of Law presents itself as a "counter-discourse" to traditional legal theory, especially legal positivism, considering that "knowledge is historically produced, which makes it impossible for it to be neutral and objective in the scientific production intended by modern thinkers" (Costa & Assis, 2010, p. 5897).

(...) a theoretical-practical formulation that reveals itself in the form of an exercise capable of questioning and breaking with the normative that is

disciplinarily ordered and officially enshrined (in knowledge, discourse, behavior and the institutional) in a given social formation and the possibility of conceiving and operationalizing other differentiated, non-repressive and emancipatory forms of legal practice (Wolkmer, 2012, p. 44).

Thus, based on the vision of Santos (1999), who questions the greatest difficulty faced in modernity, in a world full of aspects to be criticized, the construction of a critical theory becomes challenging. In other words, critical theory is not limited to describing reality as it is. For critical theory, reality, in whatever form it is conceived, is seen as a field where "the possibilities and task of theory consist precisely in defining and evaluating the nature and scope of alternatives to what is empirically given" (Santos, 1999, p. 197).

Reflecting on the critique projected through the lens of decoloniality and the circumstantiality of the "global South", a provocation arises around the discourse of the continuity, resumption or renewal of "critical theory". First of all, it is necessary to consider the breadth and ambiguity of the terms "critical theory" and "critical theories of law". The problem of "criticism" in the philosophical and cultural memory of today's society finds its creation, foundation and development in the heritage of Cartesianism and Kantian criticality, "advancing in Hegelian dialectics, deepening in Marxist historical materialism, passing through psychoanalytic subjectivism and the complexity of postmodern deconstructivism" (Wolkmer, 2019, p. 2721).

In Wolkmer's (2019) words, it is possible to observe his perspective on critical theory when he states that:

Critical theories can and do differ widely. What unites them is a similar treatment of the sociological vocation, a concern to keep open the human potential, eternally inexhaustible and unrealized, confronting all attempts to exclude and prevent the further unveiling of human possibilities, stimulating society to continue questioning itself and preventing this questioning from ever being interrupted or pretending to be concluded. In short, it is not only possible to be a critical theorist if you have different positions from everyone else. I believe that substantive variety, revealing the plurality of possibilities and their "indeterminate" status, is the sine qua non and hopefully permanent condition of a sociology capable of fulfilling its critical destiny (Bauman, 2011, p. 39).

In this context, the law makes room for principles, imbuing proposals with social values. It is therefore drafted in line with the needs of the society in which it is applied. This allows the operator of the law to have the legal certainty of the objective norm, but also requires a moral interpretation to seek the realization of justice.

Since the last century, this transformation has been taking place in today's society. A clear example is the position of principles in the legal framework, which have moved from codes to constitutions. This shows how much these norms are valued, as they are established at the apex of legal systems.

According to Coelho (2003), the main concern surrounding critical theory refers to legal education, seeking to fill a gap by enabling jurists to act as agents of social transformation. The idea is that, by absorbing the intersubjective values proposed by the new science of law, the jurist will become responsible, before humanity and their own conscience, for the positive realization of these values from a humanist perspective. Interestingly, at international level, human rights are being protected, with clearer jurisprudential

understandings arising from dynamic and evolving interpretations of treaties protecting fundamental rights (Souza Júnior, 2008).

In this sense, the author considers that

The analysis of legal orders in the light of these standards, therefore, inserts its problematic, in the same order and phenomena already examined by Boaventura Souza Santos from his consideration about legal pluralism and the molds of interlegalities that are based on it. Santos, in fact, refers to the porosity of different legal orders, as opposed to the vision of a unity of orders, which require constant transitions and transgressions referred to emancipatory social practices, in which concrete transgressions are always the product of negotiation and political judgment (Souza Júnior, 2008, p. 139).

In the current scenario, it is undeniable that we are exposed to situations that can generate discomfort and even indignation, leading to a feeling of nonconformity. It's enough to analyze the unfulfilled promises of modernity, which often arrive in a harmful way or don't materialize as expected, resulting in negative effects, as observed by Santos (1999).

Thus, the author considers that:

Therefore, understanding the structure of an order as a hierarchical unit of a legal order subject to a monopoly of jurisdiction (or designating it based on the competitiveness of standards in permanent negotiation) results, in any case, in a theoretical and political option to recognize the validity and normative legitimacy produced in this way (Souza Júnior, 2008, p. 139).

In this context, we need to understand that the crisis of modernity is taking hold, but modernity and its values are not absent. In today's society, the effects of the crisis are noticeable, giving rise to questions that require change, but the environment is only modern; the solid foundations that make up modernity are constantly being established, albeit under frequent attack. Its truths, its precepts, its principles, its institutions and its values remain present in the institutions and in the social order, so the mere fact of being able to immediately overcome modernity is an illusion (Bittar, 2014, p. 88).

What becomes clearer is that:

If Law, as a technical instrument of regulation and control, acquires a universal format that can be shared by multiple social organizations, regardless of their stage of wealth and culture, distinctly, from the angle of its content (that is, as a social phenomenon), it is necessary to specify the particularities that separate one legal system from another. This is clear when one prioritizes law not just as a normative structure, but as a social relationship, a cultural reflection of the confluence of a given economic production with the needs of social formation and the prevailing power structure (Wolkmer, 2001, p. 83).

In this respect, the author also believes that

In advanced industrial societies, there is a greater concern with social rights, with rights to ethnic differences, with minority rights, with the regulation of certain types of conflicts related to ecology and consumption, with the growing socialization of rights and access to justice and, finally, with a normative order characterized by distributive, persuasive, promotional and rewarding functions (Wolkmer, 2001, p. 83).

In the face of this critical questioning, a number of assertions emerge about the rationale behind these "new" rights. The tradition of asserting and winning rights has consistently highlighted the value attached to the relevant "needs" of each era. Thus, the reason for the priority given to the "needs" of individual freedom in 18th century Western Europe, the "needs" of political participation in the 19th century, and the alignment with economic equality and quality of life in the 20th century becomes clear (Wolkmer, 1994, p. 42-47).

The core of the proposal here is to consider the "new" rights as a reinforcement of historical needs within the relative and plural context of social agents in a given societal formation. It is important to emphasize that although needs are mostly related to quality of life, well-being and social materiality, individual, political, religious, psychological, biological and cultural determinants cannot be ignored.

The set of human needs, which encompasses both the individual and the group to which they belong, involves processes of subjectivity, ways of life, desires and values, as well as the constant "absence" or "void" of something desired that is not always achievable. Individual needs are constantly being redefined and created, as they are never completely satisfied and are unlimited in time and space (Wolkmer, 1994). Consequently, issues of need and want motivate and enable the emergence of "new" rights.

Transformations and advances in the way people, groups and classes live, produce, consume and relate are capable of defining desires, wishes and interests that transcend the limits and conditions of the system, generating situations of need, want and exclusion. In peripheral contexts, such as Brazil, this becomes evident through the claims and demands of emerging social individuals, which focus primarily on the rights to life, i.e. the basic rights to live and experience dignity (Wolkmer, 1994).

In this context, the author considers that:

By posing the problem of legal pluralism as articulable with the problem of the concept of law, Boaventura de Sousa Santos has addressed important questions to the philosophy and theory of law. However, as these interpellations come from a prior question that is presupposed - that of authenticity and validity, on the social and theoretical levels of plural normativity - it was also up to legal sociology to open up epistemological guidelines for resolving this original problem (Souza Júnior, 2008, p. 139).

According to Souza Júnior (2008), a significant part of the sociological-legal production from the 1980s onwards, influenced by both legal criticism and decisions related to the alternativity of the law, is the result of interlocution with the proposals of Roberto Lyra Filho and Boaventura de Sousa Santos.

In this context, Bittar (2014, p. 165) summarizes that the ineffectiveness of the legal system is related to important issues that bother and concern society, such as the lack of access to rights, the deprivation of minimum rights, impediments to citizenship, democratic deficits and the distance between the legal promise and social reality. These factors result in a deterioration in the legitimacy of the legal order and show a significant change in the project to implement, affirm and consolidate the Democratic Rule of Law

In the contemporary insurgency of "critical theories" in law, legal pluralism of the decolonial and transformative type emerges as one of its most significant

variants, since its specificity includes multiple experiences of normativity that go beyond the state, including an extensive range of particular underlying experiences, among many, such as community, indigenous, quilombola, customary, "peasant" and itinerant justice. Although we can find countless examples of normative plurality in the rich manifestations of indigenous justice in Latin America (Mexico, Guatemala, Ecuador, Peru and Bolivia) and in the ancestral communities of Africa and Brazil, transposing the classic research of Boaventura de S. Santos in Rio de Janeiro (Pasárta), we can also find an example. Santos in Rio de Janeiro (Pasárgada), we arrive at the theoretical-academic experience of "community-participatory" legal pluralism (A. C. Wolkmer), which has borne fruit for a whole generation of Latin American researchers, and the remarkable and successful operational contribution of legal pluralism, represented by "Law found on the street" (R. Lyra Filho and José Geraldo de Sousa Jr.) (Wolkmer, 2012, p. 2729-2730).

The current crisis affecting society calls modern law into question. Law needs to update itself, be able to identify the expected responses and mold itself to the needs of society, responding to democratic demands. This must be done in a clear and logical way, avoiding misleading answers to the questions already raised (Bittar, 2014).

Thus, the author considers that:

Legal norms are the object of legal science, and human conduct is only such to the extent that it is determined in legal norms as a presupposition or consequence, or - in other words - to the extent that it constitutes the content of legal norms. With regard to the question of whether inter-human relations are the object of legal science, it must be said that they are also the object of legal knowledge only insofar as they are legal relations, that is, as relations that are constituted through legal norms (Kelsen, 1999, p. 50).

Indeed, based on the idea that "legal science seeks to apprehend its object legally", and according to Kelsen's conception of Law, Law is understood "as a legal norm or the content of a legal norm, as determined through a legal norm" (Kelsen, 1999, p. 50). The question then arises: to what extent can the production of legal knowledge incorporate political issues from the perspective of law?

Both static and dynamic legal theories focus on norms that control the creation and application of law. This highlights an essential characteristic of law: it has control over its own production and application, regardless of other factors. In other words, the actions of producing and applying law "are of interest to legal knowledge only insofar as they form the content of legal norms, insofar as they are determined by legal norms" (Kelsen, 1999, pp. 50-51).

This means that the political, economic, social and other factors that influence the creation and application of law do not constitute the object of legal knowledge: "it is not, in fact, law itself that forms the object of this knowledge" (Kelsen, 1999, p. 72).

The proposal, then, is a normative interpretation of the facts. The role of legal knowledge lies in legal production itself:

Legal science as knowledge of law, like all knowledge, has a constitutive character and therefore "produces" its object insofar as it apprehends it as a meaningful whole. (...) the plurality of general and individual legal norms laid down by legal bodies, that is, the material given to the science of law, is only transformed into a unitary system free of contradictions, that is, into a legal order, through the knowledge of legal science. This "production", however, has a purely theoretical or gnoseological character. It is something completely different from

the production of objects by human labor or the production of law by legal authority (Kelsen, 1999, p. 52).

Kelsen's commitment to forming the structures of a legal science is shaped by the quest to make it compatible with the characteristics of the natural sciences, in his duty to design law as a phenomenon (Kelsen, 1999, p. 54). It is under this paradigm that elements of the natural sciences - such as the principle of causality - are translated in an analogous way to legal science - brought in as the principle of imputation.

Only to the extent that law is a normative order for the conduct of men among themselves can it, as a social phenomenon, be distinguished from nature, and can legal science, as a social science, be separated from the science of nature (Kelsen, 1999, p. 54).

Furthermore, just as in the natural sciences, the proposals of legal science show themselves to be a presentation of its object that is distant from extra- or meta-legal values. In other words, an approach that separates legal elements from other elements that also control or determine society.

Due to its variables, Critical Legal Theory is criticized for not forming a precise theory (Costa, Assis, 2012). The directions developed in the critical field of legal theory do vary. Some adopt a multidisciplinary or transdisciplinary approach, while others extend to the disciplines of the social sciences, going beyond law itself (Costa, Assis, 2012). Similarly, some approaches focus on criticizing legal practice that diverges from the principles that guide it, while others are dedicated to analyzing the ideological formation of law and its superstructure (Wolkmer, 2012).

Final Considerations

The transformations and social desires of each era directly influence the creation of regulatory legal norms. Today, in a complex and multipolarized society, there is a clear need to establish new criteria for the creation and application of modern law.

The capitalist production model has played a decisive role in the evolutionary process of the modern state. Globalization, with its economic influence, represents the greatest challenge to the social and political order that emerged in post-war Europe. State borders can no longer be adapted in an attempt to contain the institutions that regulate life in society.

It is essential to adopt a critical approach that rescues man from his condition of inertia and alienation, allowing him to see the world around him in its real possibilities. This implies the ability to identify the obstacles that prevent this from happening and to look for viable alternatives to overcome the problems.

Individuals in a democratic group have the ability to characterize their social sphere and develop the necessary condition for action to intervene in it. The legal concept of self-legislation needs to be understood in a political dimension that extends to the proposals of a society that acts on its own. In this way, society can engage democratically in the development of values that will later be shaped into principles to be analyzed by rule enforcers in order to effectively achieve the justice sought by society.

Furthermore, only with the effective transformation of each citizen's consciousness, through a critical eye and communicative actions, will it be possible to reformulate the self-

understanding of the Democratic Rule of Law. This will allow citizens to recognize themselves as participants in a community subject to the cooperation of mutual interests.

Post-positivism, in this context, is being constructed as a response to the needs of a new social configuration, with aspirations and expectations that are different from those that gave rise to legal positivism. A society with mature and highly communicative political ideas is better placed to achieve independence. The exchange of knowledge and the high level of education of its individuals constitute a claiming force that is more likely to guarantee an independent public sphere, free from the influence of the media, the state and the market. Modern society has sought new paradigms, turning its attention to practical reason in the development of a new law based on critical theory. This new law aims to maintain control over the new relationships that involve people in a complex and multifaceted society, meeting their new expectations. Its purpose is to put justice into practice in an effective way, rather than merely declaring the law, which often does not correspond to the reality experienced by the individuals in this social group.

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MAPPING OF SCIENCE AND TECHNOLOGICAL DEVELOPMENT ON MANGABA – *HANCORNIA SPECIOSA GOMES*

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Abstract

Hancornia speciosa Gomes has a positive impact on human and animal health, food, increased agricultural and industrial productivity and socioeconomic and environmental sustainability, by optimizing and making better use of natural and technological resources. Mapping of articles and reviews was carried out in the Scopus database, using data processing from R and Rstudio's bibliometrix biblioshiny. For patent mapping, the Google Patents database was used, between 2014 and 2023, totaling 157 articles and 30 patents. In the period between 2019 and 2023, there was an increase in articles of around 13.69% and 3.33% in patents, compared to the period between 2014 and 2018. About the creation of new mangaba products, the food technology, medical and pharmacological sciences are those that contribute most to the use of mangaba.

Keywords: Mangaba; Bioeconomy; Intellectual Property; Innovation and Development.

Introduction

Species *Hancornia speciosa* Gomes, the mangaba tree, and its mangaba fruit have attracted the interest of producers and consumers due to their attractive sensory characteristics and beneficial health properties, which are attributed to their high nutritional value and the presence of bioactive substances (Vasconcelos et al., 2023). The plant is utilized in folk medicine, with the leaf and bark extracts exhibiting anti-inflammatory, antihypertensive, antidiabetic, and antimicrobial properties (SANTOS et al., 2016). Additionally, the plant has been shown to be effective in the treatment of dermatitis, diabetes, liver diseases, and gastric disorders (Torres-Rêgo et al., 2016).

Hancornia speciosa Gomes (Apocynaceae) is a fruit tree, commonly referred to as mangabeira, which is widely distributed throughout Brazil (Santos et al., 2016). The mangaba fruit exhibits considerable variation in size, typically being ellipsoidal or rounded, yellowish or greenish, and having yellowish flesh (Dutra et al., 2017). The mangabeira is a tree native to the Midwest, Southeast, North, and Northeast regions of Brazil. It is most abundant in the coastal plains and tablelands of the Northeast and Cerrado. These areas collectively account for nearly the entire national harvest (marinho et al., 2011). The ecological niche of the mangabeira is characterized by transitional environments with three formations that form a trinomial: dunes, restinga, and Atlantic Forest (Costa et al., 2020).

Nunes et al. (2021) note that *Hancornia speciosa* Gomes is a tree native to South America, and its fruits are a source of income for communities and the food industry. In the northeast, mangaba is of great importance as an alternative source of income and subsistence for many rural communities (Oliveira and Aloufa, 2021). The fruit is used mainly in the

northeast to supply the agro-industry sector in the production of juices, sweets, ice cream, and other derivatives (Lúcio et al. 2022).

The mangaba fruit has considerable market potential in the tropical fruit sector, due to its diverse range of products and by-products (Silva et al., 2023). It is a nutritionally dense fruit with distinctive sensory characteristics, making it a promising raw material for the development of new products (Almeida et al., 2020). Studies have demonstrated the bioactive benefits of mangaba, attributed to the presence of phenolic compounds, including chlorogenic acid and rutin (De Lima et al., 2015), ascorbic acid (Almeida et al., 2011; Shiassi et al., 2018; Santos et al., 2018), and carotenoids (Rufino et al., 2009). It is a fruit of high nutritional value, containing significant amounts of provitamin A and vitamins B1, B2, and C, as well as minerals such as iron, phosphorus, and calcium (Reis and Schmiele, 2019).

The fruit species and their respective Brazilian fruits have attracted the interest of researchers in Brazil and other countries. Rufino et al. (2009) highlight that the country boasts a diverse array of native and exotic fruit species that have yet to be fully explored. These fruits have the potential to be of interest to the agro-industry and could serve as a future source of income for the local population, given the growing recognition of their nutritional and therapeutic value in both national and international markets.

As observed by Barreiros et al. (2018), there has been a notable increase in interest in the study of antioxidants, largely due to the discovery of the effects of free radicals on the human body. Almeida et al. (2011) indicate that previous studies have indicated that the uncontrolled production of oxygen, derived from free radicals, is involved in the onset of many diseases, such as cancer, rheumatoid arthritis, as well as in the degenerative process associated with aging, including Parkinson's diseases. Foods rich in antioxidants play an essential role in preventing these diseases.

The reduction in the areas of natural occurrence of *Hancornia speciosa* Gomes, the absence of a sustainable management plan, conservation and improvement programs, and the resulting threat to its natural populations (Nunes et al., 2021) are of concern. Moraes et al. (2023) argue that this is a fruit species with exploitation potential, which makes it relevant to adopt strategies related to its conservation and improvement.

Silva et al. (2022) highlight that the mangabeira is a fruit tree at the early stages of domestication and possesses considerable economic potential. However, it is being adversely affected by genetic erosion, which underscores the importance of elucidating the genetic diversity existing in mangabeira populations to support conservation programs (Luz et al., 2020). Another risk factor for the species is the paucity of knowledge regarding the methods of productivity and latex bleeding in the mangabeira. This tree is generally used extractively for fruit production (Arruda et al., 2016). About fruit production, the predominant form of cultivation is extractive (Santos et al., 2021). The fruits are seasonal and suffer significant postharvest losses (Clerici and Carvalho-Silva, 2011). Their short shelf life limits their commercialization (Dutra et al., 2017).

Hancornia speciosa Gomes has ethnobotanical and medicinal applications in the Atlantic Forest biodiversity hotspot of northeastern Brazil (Álvares-Carvalho et al., 2022). Scientific research has yielded results that do not always align with popular or traditional knowledge regarding the use of mangaba and mangabeira. Cercato et al. (2015) investigated this species for weight loss purposes for overweight or obese people, but after evaluating the study, the results were not scientifically proven.

Moraes et al. (2008) demonstrated in their research that the infusion of mangaba bark had no gastroprotective effect, but the hydroalcoholic extract promoted an increase in the

amount of mucus, healing action, and had an anti-*Helicobacter pylori* effect. Neto et al. (2020) concluded that after investigating some plants of the cerrado, such as the mangabeira, the scientific basis for the traditional use of these medicinal plants in wound healing does not provide sufficient information on the efficacy of the treatment, the molecular mechanisms, or the effective doses used and drug interactions.

Mangabeira latex, a plant native to the Cerrado, has biotechnological potential for the development of new drugs (Arruda et al., 2016). Marinho et al. (2011) demonstrated that mangabeira latex exhibits significant anti-inflammatory activity by inhibiting the production of nitric oxide, PGE2, and cytokines, thereby corroborating the traditional use of this plant as an anti-inflammatory agent. Almeida et al. (2019) demonstrated that this latex is biocompatible with living systems, suggesting its suitability as a biomaterial for medical applications. Torres-Rêgo et al. (2016) demonstrated that the aqueous extract of mangaba has therapeutic potential for the development of herbal medicines with anti-inflammatory properties.

Pereira et al. (2015) demonstrated the potential antidiabetic effect through a mechanism dependent on the inhibition of α -glucosidase and increased glucose uptake. These results support the use of this medicinal plant in traditional medicine. Additionally, de Oliveira Yamashita et al. (2020) demonstrated that the juice could reduce the inflammatory effects induced by *T. serrulatus*, indicating that the use of the juice may be beneficial for the treatment of scorpion stings.

This research project aims to conduct a scientific and technological mapping of *Hancornia speciosa* Gomes with the objective of contributing to socio-economic and environmental development. In particular, the project will consider the potential of this plant to produce new products with high added value, as well as the use of agro-industry waste through the circular economy. The optimal utilization and advancement of natural resources and technologies derived from *Hancornia speciosa* Gomes have the potential to significantly impact human and animal health, food security, agricultural and industrial productivity, and the sustainability of the local, regional, and national economies.

The introduction must contain, at a minimum, the following elements: theme, contextualization, brief description of the problem, justification of the study, objectives, results, and suggestions for future research, if any.

Methodology

Science was mapped by surveying scientific articles and literature reviews. Technological development was analyzed by surveying and analyzing patents from the international classifications (IPC) previously selected based on keywords, as well as analyzing registrations of cultivars.

Document Survey of Articles and Literature Reviews

The documents for the Systematic Literature Review (SLR) and scientific mapping were collected from published articles and literature reviews on the subject according to the keywords in the Scopus database. The procedure for obtaining, cleaning, and processing the data was as follows:

- i. Search in the Scopus database using the keywords "mangaba or " *Hancornia speciosa* Gomes or mangabeira" totaling 268 articles and reviews.

ii. To analyze the last ten years, the list of documents was reduced to the period from 2014 to 2023, totaling 157 documents.

iii. Presentation of bibliographic data from the Scopus database in CSV format for bibliometric analysis.

iv. Application of the R and RStudio programs and use of bibliometrix/biblioshiny to process bibliographic document metadata, such as citations, scientific collaboration, and analysis of articles by year (Calazans et al., 2021).

Patent survey on the use of *Hancornia speciosa* Gomes

The patent survey and technological mapping were carried out in the following stages:

i. Searching for and using patents on Google Patents using the keywords mangaba with 91 patents and *Hancornia speciosa* Gomes with 45 patents, totaling 136 patents.

ii. Data analysis, removal of duplicate documents and selection of the patent sample.

iii. Mapping of 29 product and process patent documents, between 2014 and 2023, with the aim of monitoring technological trends on the subject.

Searching the websites of companies and research institutions to find out about their mission and market activities

i. A survey of *Hancornia speciosa* Gomes cultivars on the website of the Brazilian Ministry of Agriculture (MAPA).

ii. An IBGE survey of mangaba production.

iii. A survey of companies that sell products with added value using mangaba or mangabeira.

iv. An analysis of compliance with the targets of the UNU's second sustainable objective.

Results and Discussions

In the last ten years, from 2014 to 2023, studies on the *H. Speciosa* Gomes have highlighted some areas with the greatest contribution, such as agriculture, biological sciences, biochemistry, genetics, and environmental sciences.

Of the 157 articles published in this period, the most important researchers are linked to the Federal University of Sergipe, the Federal University of Goiás and the Agricultural Research Corporation - Embrapa.

In 2015, there were 25.33 citations per article. When comparing two five-year cycles, the first cycle had 73 articles (2014-2018) and the second cycle (2019-2023) had 83 articles, which indicates a 13.69% increase in publications on the subject over the last ten years.

The number of articles may indicate that the state of the art has been surpassed, i.e. scientific advances on the subject. Thus, three authors are most relevant in this corpus: Chaves from the Federal University of Goiás, with a focus on genetics; Muniz and Da Silva from

Embrapa Tabuleiros Costeiros, who work mainly on issues related to genetic resources and the evolution of plant culture. All of the authors have utilized an active germplasm bank of mangaba at their respective institutions and are engaged in the implementation of conservation and improvement strategies for the *Hancornia speciosa* gomes species.

In terms of agricultural and biological sciences, the number of articles published during the second period (2019 to 2023) was 57, representing an increase of 29.54% compared to the first period (2014 to 2018), during which 44 articles were published. The universities with the largest number of researchers are the Federal University of Lavras, the Federal University of Sergipe, and the Federal University of Goiás. These universities are primarily engaged in the study of biodiversity and conservation.

The three articles that stood out in the areas of agriculture and biological sciences indicate the relevance of mangaba's bioactives. The first, from 2018 with 109 citations, analyzed the fruits of the Brazilian cerrado, including physicochemical characterization, bioactive compounds, antioxidant activities, and sensory evaluation. Mangaba was among the bioactive compounds analyzed.

The two most recent articles on this topic are from 2017. The first is a study on the bioaccessibility and antioxidant activity of phenolic compounds in frozen pulps of exotic Brazilian fruits subjected to simulated gastrointestinal conditions, including siriguela, umbu-cajá, and mangaba. The second is a study on the bioactive compounds of oils extracted from fruit seeds obtained from agro-industrial waste, including mangaba. The study proposes the use of the oils in the development of functional foods, as well as in the chemical, pharmaceutical, and cosmetic industries. The study, which has 57 citations, examines the bioactive compounds of oils extracted from fruit seeds obtained from agro-industrial waste, such as mangaba. It proposes the use of these oils in the development of functional foods, as well as in the chemical, pharmaceutical, and cosmetic industries (Da Silva and Eur, 2017).

In 2022, the field of biotechnology and genetics had the highest number of publications, with six articles. However, when comparing the number of articles published over two five-year periods, there is no indication of a significant increase. In this area, the University of Sergipe has the highest number of affiliated authors in the total number of articles, followed by the University of Goiás and the University of Lavras. All of these studies are important for genetic diversity, which is necessary for the improvement and conservation of species. Research with microsatellite DNA is one of the main themes in this area.

The three most relevant articles are: the analysis and chemical composition, antioxidant activity, and sensory acceptance of six fruit pulps from the Brazilian Cerrado, including mangaba. This article was cited 109 times (Schiassi et al., 2018).

The second article, with 102 citations, is a study by Bailão et al. (2015) on bioactive compounds found in fruits from the Brazilian Cerrado, such as mangaba. The third article, with 79 citations, is a study by Dutra et al. (2017) on the bioaccessibility and antioxidant activity of phenolic compounds in frozen pulps of exotic Brazilian fruits exposed to simulated gastrointestinal conditions.

In the past decade, 18 articles have been published about environmental technologies and the species in question. The institutions with the highest number of researchers publishing on the subject were the Federal Institute of Goiás, the University of Brasília, and the Federal University of Rio Grande do Norte.

In terms of articles on environmental technologies, the first is the production and characterization of bio-oil, with 66 citations by Santos et al. (2015). The second is the

production and characterization of tanase from *Penicillium montanense* RM 6286 under SSF using agroindustrial waste and its application in the clarification of grape juice (*Vitis vinifera* L.) with 37 citations by Lima et al. (2014). The latter, with 24 citations, conducted a physical and physicochemical characterization of mangaba fruits (*Hancornia speciosa* Gomes) in the west of Bahia. The results demonstrated high variability in mature mangaba matrices, indicating that the population has high genetic potential for improvement studies (Nascimento et al., 2014).

About the development of products and processes derived from *Hancornia speciosa* Gomes, the universities, institutes, and Embrapa that have published the most scientific articles demonstrate the potential for technical feasibility. It should be noted that at least two researchers from two different institutions are responsible for each published article, with the exceptions being the mixed jelly from the University of Lavras (UFLA) and formulations of mixed umbu and mangaba nectars from the Federal University of Sergipe (UFS).

The institutions that have published articles with a product or process are: Embrapa Instrumentação de São Carlos/SP, Faculdade de Saúde Ibituruna (FASI), Instituto Federal Mato Grosso (IFMT), Rede de Biotecnologia do Nordeste (RENORBIO), Universidade do Sagrado Coração(USC), Universidade Estadual de Londrina (UEL), Universidade Estadual de Montes Claros (UNIMONTES) and Universidade Estadual do Sudoeste da Bahia(UESB), Universidade Federal de Minas Gerais (UFMG), Universidade Federal do Tocantins (UFT),Universidade Tiradentes(UNIT). University of São Paulo (USP), Federal University of Sergipe (UFS), Federal Institute of Education of Rio Grande do Norte (IFRN), University of Campinas (UNICAMP), Paulista State University (UNESP), Federal University of Paraíba (UFPB), Federal University of Goiás (UFG), Federal University of Lavras (UFLA).

Of the 14 technologies, nine are from the food technology area, two from biocosmetics, two from medical technologies, and one from engineering. Two biocosmetics articles that were published in 2022 by UFT and UNESP are: Development of a facial serum formulation and Herbal shampoo with antioxidant activity.

Two medical technologies are discussed in the articles. One is the development of a mangabeira latex biomembrane for the treatment of skin wounds (subcutaneous implants) from UNESP and USP (Pegorin et al., 2021). The other is a biomaterial for the tissue repair process that may be viable for future applications as a dressing from the institutions USC, USP, and UFG (2020).

One technology from the engineering area is Bio-oil from UFS and the RENORBIO network in 2015. As shown in Table 1, the largest number of products and processes identified in the corpus are from the area of food technology.

Table 1 – Food Technologies by year of publication of scientific articles

Year of Publication	Product or Process	Institutions
2023	Bioactive films with potential applications as food packaging materials	Embrapa São Carlos/SP, UFG and USP
2023	Mixed Jelly	UFLA
2021	Fermented milk drink	FASI, UFMG e UNIMONTES
2021	Mangaba fermented alcoholic drinks	UNICAMP, UFPB e IFRN
2021	Making mangaba vinegar by semi-solid fermentation combined with enzymatic activity	IFMT, UNICAMP e UEL
2021	Ice Cream Powder with Low Energy Value and High Prebiotic Fiber Content	UFLA, USP e UESB
2020	Mangaba fermented alcoholic beverages	UFPB e IFRN

2020	"Green" lipase from <i>Aspergillus niger</i>	UFS e UNIT
2018	Formulations of mixed umbu and mangaba nectars	UFS

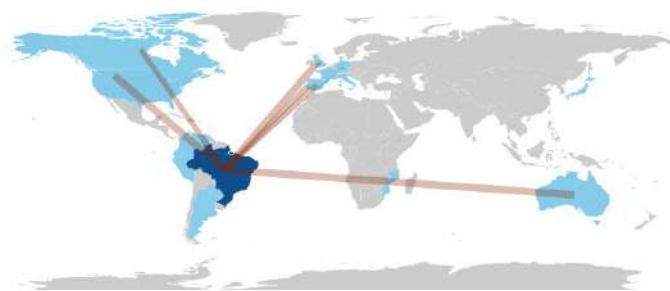
Source: Prepared by the authors (2024)

About collaboration with other countries over the last ten years (2014 to 2023), as illustrated in Figure 1, we present the following information per article:

In 2017, research was conducted in collaboration with the Federal University of Paraíba, the Federal University of Rio Grande do Norte, and the Leibniz Institute for Plant Biochemistry in Germany. The objective was to address the limitations of knowledge regarding the chemical composition of the *Hancornia speciosa* Gomes species. The findings indicated that *Hancornia speciosa* can serve as a valuable source of phenolic compounds (Bastos et al., 2017).

In 2018, the Federal University of Grande Dourados (MS) and the Polytechnic Institute of Bragança in Portugal demonstrated the antioxidant, antimutagenic, anti-inflammatory, anti-Alzheimer's disease, anti-Parkinson's disease, anti-obesity, and anti-hyperglycemic activities of the ethanolic extract of *H. speciosa* leaves (EEHS).

Figure 1 - Scientific collaboration between countries on *Hancornia speciosa* Gomes



Source: Prepared by the authors (2024)

In 2023, the University of Brasilia and the University of Tasmania in Australia investigated some Cerrado plant species such as *H. speciosa* Gomes to evaluate hepatoprotective effects on paracetamol-induced hepatotoxicity in HepG2 cells to be used as candidates for supplements that could be used to prevent liver damage (Ribeiro et al., 2023).

Also, that year, an article by researchers from the Federal University of Santa Maria/RS and the Lúrio University (UNILURIO) in Mozambique investigated the genetics of the mangaba species, using data from analyses using microsatellite markers in computer simulations in areas of six mangaba populations located in the northeastern states of Ceará, Pernambuco and Sergipe, and identified factors that explain the species' low genetic diversity (Serrote et al., 2023).

Technology mapping

In Brazil, cultivars and species must be licensed to produce and sell seeds and seedlings. About the species, *Hancornia speciosa* Gomes, registration number 24143 was identified on July 21, 2008. However, no intellectual property title has yet been granted for cultivars obtained by plant breeding methods for *Hancornia speciosa* Gomes.

About patents, in 2009, the Sergipe State Secretariat for Inclusion, Assistance and Social Development (SEIDES) sought to protect fruit-based products and bakery products in order to generate income for the local mangaba farming community. Additionally, the portfolio encompasses confections, including mangaba cookies, mangaba candy, mangaba

candy mixed with dulce de leche, mangaba bonbons, mangaba cake, mangaba truffles, traditional mangaba liqueur, candied mangaba, and mangaba jam.

A total of 30 patents were published between 2014 and 2023. During the initial five-year period (2014 to 2018), 14 patents were published, while in the subsequent five-year cycle (2019 to 2023), 16 patents were registered. From 2019 to 2023, there were 16 publications, with the majority held by Science and Technology Institutions (ICT), including universities, research institutes, and the productive sector represented by one company that registered two patents.

The year 2018 saw the publication of six patents, representing the highest number in the period analyzed. This increase can be attributed to the development of researchers in the northeast, particularly those affiliated with UFPB, UFCG, UFS, and UFCE.

Pele Nova Biotecnologia S.A. is the only company to have patented products and processes utilizing mangaba/mangabeira. It develops and markets therapeutic and dermo-cosmetic products derived from Brazilian biodiversity, with an expected launch in 2024.

The company's patent (BRPI0504797B1) has been protected in other European countries, the United States, and Japan. The company has developed microporous latex membranes for use in clinical applications, including wound healing. These membranes are produced using materials from different types of latex, extracted from one or more selected rubber trees from *Hevea brasiliensis*, *Hancornia speciosa*, *Couma macrocarpa*, *Ficus indica*, *Parthenium argentatum*, or subspecies thereof (Mrue, 2005).

The second patent held by this company, PI0405995, has not been protected in other countries. The patent describes a composite bio-membrane for reinforcing, correcting, or reconstituting animal organs or body tissues, as well as its use. The patent was filed in 2004 and published in 2005 (MRUE, 2004).

The patent for the standardized extract and fraction of *Hancornia speciosa* leaves and its pharmaceutical composition for the treatment of cardiovascular disorders such as arterial hypertension, atherosclerosis, restenosis, non-limiting cardiac or cerebral ischemia has been protected in other European countries, Canada, and the United States (Braga et al. 2008). The patent was published in 2015 (JP-2015013896-A), thus establishing a family of patents aimed at the potential production of herbal medicine and its commercialization on the international market.

In terms of technology, 50% of the area covering biotechnology, pharmaceuticals, and medical technologies is due to application technologies for the health of humans and animals.

The second area of focus is food technology, which accounts for 43.33% of the total.

The sole patent pertaining to the utilisation of environmental technology pertains to the utilisation of a bioadsorbent derived from mangaba seeds for the removal of contaminants from water and liquid effluents (Leite et al. 2017) originating from the University of Fortaleza (UFS). To contribute to the advancement of sustainable agriculture within the mangaba plantation, a solution and process for the conservation of recalcitrant seeds (Mann et al., 2021) originating from the UFS have been developed.

It is noteworthy that the northeastern ICTs have played a pivotal role in enhancing the value of mangaba fruit and mangabeira trees. Of the total 30 patents, their contribution represents approximately 73.33% of the total, with a particular emphasis on the ICTs from Sergipe and Paraiba. Table 2 shows the 10 main technologies that use mangaba/mangabeira

Table 2 – Top 10 technologies using mangaba/mangabeira

Year of Publication	Product or Process	Institutions
2016	Method for lipase production of aspergillus niger using mangaba pulp processing waste as substrate - BR102014013453	UFS
2021	Composition and process for obtaining healing film and film thus obtained - BR-PI1106145	UNIT e ITP
2020	Process of obtaining mangaba raisins with solar drying and product obtained - BR-102019003177	ITP, UNIT e UFS
2022	Solution and process for preserving recalcitrant seeds - BR102021009165	UFS
2022	Pharmaceutical formulation containing natural latex and its use for treating skin wounds - BR-102021005471	IFBAIANO
2015	Standardized extract and fraction of Hancornia speciosa leaves and its pharmaceutical composition - JP2015013896 (protected in Japan)	UFMG
2019	Mixed jelly with umbu (spondias tuberosa arr. câmara) and mangaba (hancornia speciosa gomes) added with fructooligosaccharide - BR102017015140	Univ Fed Rural De Pernambuco
2014	Composition of mangabeira latex and its use in bone regeneration - BR102012025418	Unicamp
2016	Process for obtaining a new bactericide from mangaba latex (hancornia speciosa gomes) - BR102013018181	UFPE
2019	Use of the extract obtained from hancornia speciosa gomes - apocynaceae or any of its derivatives as an antimicrobial agent - BR102017025846	IPT e UNIT

Source: Prepared by the authors (2024)

Analysis of the Brazilian market

In the context of mangaba extractive production in the period from 2009 to 2022, according to IBGE data, there has been an increase in the amount produced of the fruit in Brazil since 2016, which has exceeded 1,000 tons, with the peak of production in 2021 reaching approximately 2,173 tons. Comparing five-year cycles, the second cycle from 2018 to 2022 more than doubles the amount produced with a percentage increase of 127% compared to the amount produced in the first cycle from 2013 to 2017.

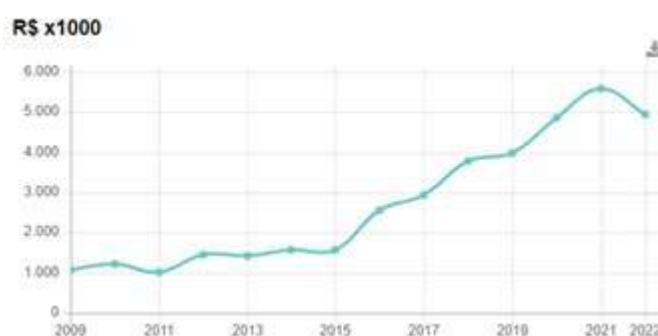
In this historical series, we also see an increase in the value of the fruit's production on the domestic market, with an increase of 130.70% when comparing the second cycle with the first. IBGE production data for 2022 shows that the three largest producers are Paraíba, Sergipe and Bahia, respectively.

Figure 2 – Vegetable extraction/Food/Mangaba/Fruit/Productive quantity (Unit) from 2009 to 2022



Source: IBGE (2024)

Figure 3 – Vegetable extraction/Food/Mangaba/Fruit/Quantity of production (Unit R\$x1000) from 2009 to 2022



Source: IBGE (2024)

The sale of mangaba pulp must adhere to the parameters established by the legislation of the Ministry of Agriculture (Brazil, 1997) in the Technical Regulation for the Establishment of Identity and Quality Standards. About companies that market mangaba and latex products, we would like to highlight two companies that operate in the biocosmetics sector: Pele Nova Biotecnologia S.A. has been in operation since 2003 and develops therapeutic and dermo-cosmetic products from Brazilian biodiversity using patented technologies.

The startup Cicatribio Cosmetics and Biopharmaceuticals, which obtained a license for patent no. BR-102021005471 from IFBAIANO, subsequently launched a product on the market aimed at animals, CicatribioVET.

Sustainability

The technical and technological challenges of maintaining and increasing mangaba production in Brazil are related to the second United Nations Sustainable Development Goal, Zero Hunger and Sustainable Agriculture (SDG2), and the achievement of the Agenda 2030 targets. The production and consumption of more nutritious foods, such as mangaba fruit and foods benefiting from the fruit, contributes to achieving targets 2.1 and 2.2.

As the mangaba farming community is predominantly female, progress towards target 2.3 implies efforts to double agricultural productivity and income in the context of small-scale food producers, particularly women and family farmers. Mangaba production must facilitate and guarantee the sustainability of food production systems and implement resilient agricultural practices that enhance productivity and production, maintain ecosystems, enhance adaptive capacity to climate change, extreme weather conditions, droughts, floods, and other disasters, and progressively improve land and soil quality, in accordance with target 2.4.

About mangaba, which suffers from genetic erosion among other difficulties in planting and harvesting, target 2.5 set for 2020, despite the great efforts of Embrapa, universities and research institutes, is a difficult level to reach. In other words, it is not yet possible to maintain the genetic diversity of seeds, cultivated plants and their respective wild species, including through diversified and well-managed seed and plant banks at national, regional and international level, and to guarantee access to and the fair and equitable sharing of the benefits arising from the use of genetic resources and associated traditional knowledge, as agreed internationally and required in the 2030 agenda for Brazil.

Final Considerations

Given that mangaba is a fruit of Brazilian biodiversity, scientific studies are conducted by Brazilian specialists from the country's science and technology institutions. However, there are also contributions from researchers and institutions from other countries.

The scientific articles demonstrate the specialists' concern to ensure that mangaba is planted throughout the country. Their research focuses on studies of genetic diversity, the improvement and conservation of the *Hancornia speciosa* gomes species, the nutritional use of the fruit, and the regeneration of human and animal tissues.

About the development of products and processes to add value to the mangaba and mangabeira fruit, several articles address the technical feasibility of food, health, and environmental products, with the participation of ICTs from the northeast, midwest, and southeast, mainly. However, in terms of patent protection, the northeast was responsible for 73.33% of all patents published between 2014 and 2023.

The production of mangaba has demonstrated a consistent upward trend, while the sale of the fruit has shown a notable increase. This is despite the lack of protection for cultivars of the species, which suggests that the planting of the fruit is not yet sufficiently appreciated to increase the scale of production and transition away from an extractive model.

The production of mangaba has demonstrated a consistent upward trajectory, accompanied by a notable surge in sales. This phenomenon, despite the absence of legal protection for cultivars of the species, suggests that the planting of the fruit is not yet fully appreciated, and that there is a need to expand the scale of production and transition away from an extractive model.

To this end, there is a pressing need for both private and public investment in research, development, and innovation, as well as the transfer of technology to society.

Future Prospects

Given the prospects for progress and the limitations that exist for conserving the *Hancornia speciosa* Gomes species, increasing the scale of production and optimizing the benefits of the fruit and the mangaba tree for society, it is important to record its contribution to meeting the goals of the UN's second sustainable goal in the articles and patents on the subject.

It is necessary to better understand the contribution of research to improving the lives of mangaba extractors and the family economy.

There is a lack of research into the creation of start-ups focused on the commercialization of processed mangaba and mangabeira products.

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THE INFLUENCE OF KNOWLEDGE CREATION AND TRANSFER ON INNOVATION AND ITS IMPACT ON ORGANIZATIONAL PERFORMANCE

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Abstract

This study aimed to verify the influence of knowledge creation and transfer on innovation and its impact on organizational performance in the grape production chain in the state of Rio Grande do Sul. The research was quantitative, exploratory and descriptive in nature and operationalized through a cross-sectional survey. The population was made up of grape producers in the state of Rio Grande do Sul. The sampling process was non-probabilistic due to easy access, and the final sample was 180 respondents. Data was collected using a questionnaire made available electronically via Google Doc's and by telephone. The data was processed using descriptive statistics and structural equation modeling (SEM), using SPSS 22.0 and Smart PLS4.0. This study resulted in a representative model of the influence of Knowledge Creation and Transfer on Innovation and the Impact on Organizational Performance in the grape production chain, in the producers' link in Rio Grande do Sul, Brazil. The three latent variables (knowledge creation, knowledge transfer and product innovation) explain 39.70% of the formation of organizational performance. This leaves a gap for future studies to find other variables that can explain the missing 60.30%.

Keywords: Knowledge Creation; Knowledge Transfer; Innovation; Organizational Performance.

Introduction

Knowledge is defined as the understanding, awareness or familiarity acquired through experience, education or research, which demonstrates the ability to use information in order to solve problems, make decisions and create new ideas. According to Nonaka and Takeuchi (1995), knowledge can be explicit, which is easily articulated, codified and transmitted, or tacit, which is personal, contextual and difficult to formalize. The latter includes intuitive skills and personal experiences. Knowledge development is a continuous process involving the integration and application of new and existing information (Davenport & Prusak, 1998; Manogna, 2021).

Knowledge creation is a dynamic and continuous process that involves the interaction between tacit and explicit knowledge. Nonaka and Takeuchi (1995) point out that this occurs through four modes of conversion: socialization, externalization, combination and internalization (SECI). Socialization allows experiences to be shared; externalization converts tacit knowledge into explicit knowledge; combination organizes explicit knowledge; and

internalization incorporates this knowledge into practices. This SECI cycle is fundamental for innovation and organizational learning (Nonaka, Toyama, & Konno, 2000).

Knowledge transfer is essential for innovation and competitiveness in organizations. According to Szulanski (1996), it involves the dissemination of practices and knowledge between individuals and organizational units. Knowledge transfer is a process influenced by various factors such as the nature of the knowledge, the motivation of individuals and the quality of interpersonal relationships. According to Argote and Ingram (2000), effective knowledge transfer depends on the organization's ability to codify and communicate knowledge, as well as to create a suitable environment for continuous learning.

Innovation is the process of introducing something new or making significant changes to products, services, processes or business models, with the aim of creating value and improving competitiveness. According to Schumpeter (1942), innovation is an essential engine for economic growth and industrial development. Contemporary literature, such as the work of Tidd and Bessant (2018), highlights that innovation is not only technological, but can also be organizational and managerial, encompassing practices that promote efficiency and effectiveness. For Drucker (1985), innovation is the means by which entrepreneurs exploit changes as an opportunity for different businesses or services.

Organizational performance is an important concept that encompasses the efficiency and effectiveness with which an organization achieves its objectives. It is often measured through a combination of financial indicators, such as profit and return on investment (ROI), and non-financial indicators, such as customer satisfaction, product and service quality, innovation and the ability to adapt to changes in the business environment. Kaplan and Norton (1996) developed the Balanced Scorecard (BSC) as a tool for measuring organizational performance in a more comprehensive way, including both financial and non-financial metrics. This approach allows organizations to align their activities with their vision and strategy, improve internal and external communication and monitor performance against long-term strategic objectives.

The creation and transfer of knowledge are fundamental to innovation, boosting the financial performance of organizations. The creation of knowledge enables the generation of new ideas and solutions, while the effective transfer of this knowledge facilitates the implementation of these innovations (Goldman, 2017; Nonaka, & Takeuchi, 1997). Grant (1996) points out that companies that manage knowledge well are able to transform innovation into competitive advantage, which has a positive impact on financial performance. Teece (1998) emphasizes that the capacity to innovate and adapt to market conditions is of paramount importance for long-term growth and profitability.

This study aimed to verify the influence of knowledge creation and transfer on innovation and its impact on organizational performance.

1. THEORETICAL FRAMEWORK

2.1 Knowledge creation

Knowledge creation is a dynamic process that involves transforming and expanding data and information into applicable knowledge within an organization. According to Nonaka and Takeuchi (1995), this process includes the interaction between tacit and explicit knowledge, resulting in continuous innovation. Tyagi et al. (2015) add that knowledge creation involves constantly updating and refining the existing knowledge base. This cycle of

knowledge creation is essential for the sustainability and competitiveness of organizations in the global marketplace (Alavi & Leidner, 2001).

In this context, knowledge creation involves strategies aimed at generating new knowledge or acquiring existing knowledge, whether from internal or external sources. This includes the use of the intellectual resources available in the organization, encompassing individual and collective reflection on new working methods, products and services developed by the company (Claver-Cortés et al., 2018).

2.2 Knowledge transfer

Knowledge transfer is a critical process in modern organizations, involving the dissemination and application of information, skills and expertise from one individual or group to another within the company. This process is essential to ensure that knowledge is not restricted to a single sector or person, but becomes a collective asset that can be used to solve problems, improve processes and innovate. According to Nonaka and Takeuchi (1995), knowledge creation is a continuous process of interaction between tacit and explicit knowledge, which implies that knowledge transfer is an essential dynamic for organizational learning. Furthermore, effective knowledge transfer can be facilitated through practices such as mentoring, training, detailed documentation and the use of information and communication technologies.

The importance of knowledge transfer is highlighted in the context of organizational competitiveness. Davenport and Prusak (1998) emphasize that organizations that manage to transfer knowledge efficiently are more adaptable and innovative. This transfer is not just limited to the sharing of data and information, but also involves the socialization of experiences and practical insights that can be critical for strategic decision-making. In collaborative environments, such as communities of practice and interdisciplinary teams, knowledge transfer is key to co-creating value and building a robust and diverse knowledge base, which in turn can lead to superior organizational performance.

2.3 Innovation

Innovation is an essential element for the sustainability and growth of organizations in today's competitive environment. It can be defined as the implementation of creative ideas that result in new products, services, processes or business models that add value to customers and to the organization itself. According to Schumpeter (1942), innovation is the engine of economic development, driving creative destruction, where new products and technologies replace old ones. This process of continuous renewal is vital for companies to remain relevant and competitive in the global market.

Furthermore, innovation is not just limited to the creation of new products, but also involves incremental improvements and radical transformations to existing processes and services. Tidd and Bessant (2013) point out that innovation management requires a systematic approach that includes the generation of ideas, the selection of the best proposals, the development of viable solutions and the efficient implementation of these solutions in the market. This continuous cycle of innovation allows companies to adapt their strategies in line with changing consumer demands and technological trends.

2.4 Organizational performance

Organizational performance is a broad concept that covers the effectiveness with which an organization achieves its objectives and goals. It is often assessed through a variety of financial and non-financial indicators, such as profit, return on investment, operational efficiency, customer and employee satisfaction, and innovation. According to Kaplan and Norton (1996), the use of the Balanced Scorecard allows organizations to evaluate their

performance in a holistic way, incorporating not only financial metrics, but also customer perspectives, internal processes and learning and growth.

According to Hitt, Ireland, and Hoskisson (2008), companies that continually evaluate and adjust their strategies based on performance analysis and market feedback are more likely to prosper.

2.5 Connection between the creation and transfer of knowledge, innovation and organizational performance

The connection between the creation and transfer of knowledge, innovation and organizational performance is fundamental to an organization's success in a competitive environment. Knowledge creation involves generating new ideas and solutions, while knowledge transfer ensures that these ideas are shared and used effectively within the organization. Nonaka and Takeuchi (2007) point out that the knowledge spiral, which includes the socialization, externalization, combination and internalization of knowledge, is crucial for transforming tacit knowledge into explicit knowledge and explicit knowledge into tacit knowledge. This continuous process of creating and sharing knowledge feeds innovation, allowing organizations to develop new products, processes and services that meet market needs and increase their competitiveness.

Innovation, in turn, is a critical driver of organizational performance. Innovative organizations are better able to adapt to market changes, respond to customer demands and exploit new business opportunities. Effective knowledge transfer ensures that best practices and innovations are disseminated throughout the organization, thus promoting a culture of continuous learning. According to Teece (1998), the dynamic capacity of organizations, i.e. the ability to integrate, build and reconfigure internal and external competencies in order to respond quickly to change, is essential for maintaining and improving organizational performance. Therefore, integrating knowledge creation and transfer processes with innovation strategies results in superior organizational performance, enabling organizations to achieve their strategic objectives in an effective and sustainable manner.

2.6 Hypotheses

2.6.1 The relationship between the Creation of Knowledge and Innovation

Knowledge creation and innovation are intrinsically linked in the organizational context, where the generation and application of new ideas are fundamental to the development of innovative products, services and processes. Nonaka and Takeuchi (1995) introduced the SECI model (Socialization, Externalization, Combination and Internalization), which describes the dynamic process of converting tacit knowledge into explicit knowledge and vice versa, facilitating the continuous creation of knowledge within organizations. This model highlights that innovation does not only arise from technological advances, but also from the ability of organizations to capture, share and apply knowledge effectively. Socialization enables the exchange of tacit knowledge between individuals, while externalization and combination facilitate the documentation and integration of explicit knowledge, promoting an environment conducive to innovation.

The relationship between knowledge creation and innovation is also evidenced by the ability of organizations to manage and use their dynamic capabilities. Teece; Pisano; & Shuen (1997) argue that dynamic capabilities - the ability of an organization to integrate, build and reconfigure internal and external competencies to respond quickly to changes in the environment - are crucial for sustainable innovation. Companies that can continually generate and apply new knowledge are best placed to innovate (Liu; Wang, 2020). Thus, the following hypothesis can be stated:

H₁: Knowledge creation has an influence on innovation.

2.6.2 The relationship between Knowledge Transfer and Innovation

Knowledge transfer plays an important role in organizational innovation, as it facilitates the dissemination of information, skills and best practices among employees (Casson et al., 2009). Dixon (2000) describes knowledge transfer as a continuous process of information exchange that promotes organizational learning and innovation. This process can take place in a variety of ways, including face-to-face meetings, knowledge management systems, communities of practice and digital platforms. When knowledge is transferred effectively, organizations can avoid duplication of effort, speed up problem solving and foster an environment where new ideas and solutions can emerge. In this way, knowledge transfer not only improves operational efficiency, but also creates a solid foundation for continuous innovation (Casson et al., 2009).

Lane and Lubatkin (1998) also emphasize that the effectiveness of knowledge transfer depends on the relative similarity between organizations in terms of structures, processes and cultures, which facilitates the assimilation and application of the transferred knowledge. Therefore, knowledge transfer, both internally and between organizations, is an essential catalyst for innovation. Knowledge transfer and innovation influence financial performance (Torres et al., 2015; Mirvis et al., 2016; Qin et al., 2017; Liu; & Wang, 2020).

Consequently, the following hypothesis can be proposed:

H₂: Knowledge transfer has an influence on innovation.

2.6.3 Relationship between Innovation and Performance

The relationship between innovation and organizational performance is widely studied and recognized as vital to the long-term success of companies. Innovation, defined as the implementation of new products, processes or ideas, is a key driver of competitiveness and growth. Innovative companies are able to differentiate themselves in the market, responding more quickly to changing consumer needs and competitive pressures. Research indicates that there is a significant positive correlation between a company's ability to innovate and its financial performance, including increased revenues, profits and market share (Drucker, 1985; Tidd, Bessant, & Pavitt, 2001). For example, a study by Schilling (2013) showed that companies with well-defined innovation strategies tend to have higher returns compared to those that do not prioritize innovation.

In addition to the direct financial benefits, innovation also improves organizational performance by promoting operational efficiency and employee satisfaction. Companies that adopt a culture of innovation often enjoy more efficient internal processes, reduced costs and greater organizational flexibility (Porter, 1990). This, in turn, contributes to a more dynamic and stimulating work environment, which can attract and retain high-quality talent. According to Damanpour (1991), innovative organizations also tend to be more resilient in times of crisis, adapting better to environmental and technological changes. In short, innovation not only boosts economic performance, but also strengthens the structure and long-term sustainability of the organization.

2.6.4 The relationship between Knowledge Creation, Innovation and Organization Performance

The relationship between the creation and transfer of knowledge and innovation is fundamental to the continuous development and competitiveness of organizations.

Knowledge creation involves the generation of new ideas, concepts and solutions that can be applied to solve existing problems or exploit new opportunities. Nonaka and Takeuchi (1995) introduced the SECI model (Socialization, Externalization, Combination and Internalization), which highlights how tacit and explicit knowledge can be transformed and used within organizations. This model suggests that innovation arises from the continuous interaction between different forms of knowledge, where socialization allows the exchange of tacit knowledge, externalization facilitates the conversion of tacit knowledge into explicit, combination integrates different explicit knowledge and internalization transforms explicit knowledge back into tacit through practice. Therefore, knowledge creation is a dynamic process that feeds innovation, promoting an environment where new ideas can emerge and be applied effectively.

Knowledge transfer, in turn, is essential to ensure that innovations can be disseminated and applied throughout the organization. Inkpen and Tsang (2005) argue that effective knowledge transfer depends on the ability of organizations to create social networks and structures that facilitate communication and information sharing. Knowledge transfer can take place in a variety of ways, such as training, mentoring, communities of practice and the use of information technology. When knowledge is transferred efficiently, it allows different parts of the organization to benefit from innovations by adapting and applying new ideas to their specific contexts. Furthermore, Tsai (2001) notes that the transfer of knowledge between units within an organization can lead to a significant increase in innovative capacity, as it facilitates the combination of diverse knowledge and the exploitation of new synergies. In this way, the creation and transfer of knowledge are complementary processes that together promote continuous and sustained innovation.

Consequently, the following hypothesis can be proposed:

H4: Knowledge Creation influence innovation and and Organization Performance

2.6.5 Relationship between Knowledge Transfer, Innovation and Organization Performance

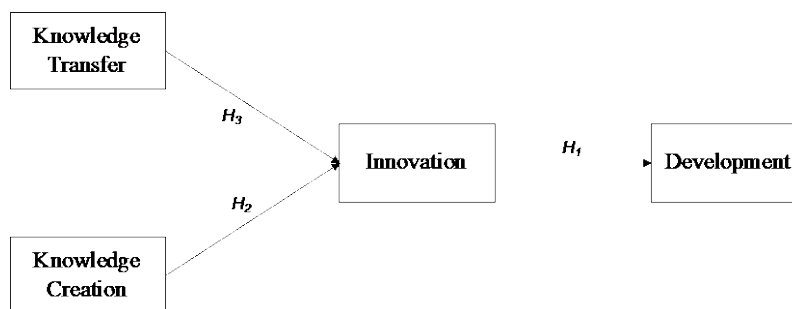
The relationship between knowledge transfer, innovation and organizational performance is complex and interdependent, where each element reinforces and enhances the others. Knowledge creation is the starting point, where new ideas and solutions are developed internally, often through collaborative and creative processes. When this newly created knowledge is effectively transferred within the organization, it becomes accessible to different individuals and teams, enabling practical application and the development of innovations.

Nonaka and Takeuchi (1995) argue that an organization's ability to continuously create and share knowledge is crucial for innovation. This innovation, in turn, is one of the main drivers of organizational performance, as it leads to the development of new products, services and processes that improve competitiveness and efficiency. Empirically, studies show that organizations with strong knowledge creation and transfer capabilities tend to have better innovative performance and, consequently, better financial and market performance (Cohen & Levinthal, 1990; Zahra & George, 2002).

Accordingly, the following hypothesis can be formulated:

H5: Knowledge Transfer influence Innovation and Organization Performance

Figure 1 shows the conceptual theoretical model.



Source: Prepared by the authors (2024)

3 Methodology

In order to achieve the outlined objective and at the same time answer the research problem, we designed this descriptive and quantitative study based on a population made up of small and medium-sized producers in the grape production chain in the state of Rio Grande do Sul, Brazil.

3.1 Target population and measurement instrument

This study focuses on the grape production chain in the state of Rio Grande do Sul, Brazil. The questionnaire items were adapted from different studies. The knowledge creation and transfer, innovation and organizational performance items were taken from (Dixon, 2000; Inkpen & Tsang, 2005; Damanpour, 1991; Teece, Pisano, & Shuen, 1997). Initially, a pilot test was carried out with 25 producers participating in the grape chain to ensure internal consistency and contextual accuracy. The initial responses indicated that the internal consistency of the constructs studied ranged from 0.72 to 0.90, in line with Hair et al. (2017), whose suggested minimum value is 0.70.

Based on the initial results of the survey, a comprehensive survey was launched on a five-point Likert scale (1 representing strongly disagree and 5 representing strongly agree), collecting data via telephone calls and e-mail, depending on the preference of the participants. In the end, 180 respondents were obtained. To characterize the respondents in the sample, the following variables were analyzed: gender, level of education and age of the survey participants.

As for the gender of the respondents, 80% were male. In terms of the respondents' level of education, 40% have completed higher education, 25% have incomplete higher education, 15% have incomplete undergraduate degrees and 15% have completed high school and 5% have incomplete high school education. In terms of age, 20% are aged up to 30, 50% are aged between 31 and 50 and 30% are aged 51 or over.

3.2 Statistical analysis to validate the instrument

The data collected was analyzed using a multivariate statistical technique using SPSS v.22, followed by structural equation modeling using SmartPLS 4.0 software. According to Hinkin (1998), before carrying out factor analysis, the absence of multicollinearity, the adequacy of the sample size and the common bias of the method must be guaranteed. The adequacy of the sample was analyzed using the Kaiser-Meyer-Olkin test, which indicated a value of 0.921, which met the minimum value of 0.60 suggested by Kaiser and Rice (1994).

Harman's single factor test was carried out to identify bias in the data collected (Podsakoff et al., 2012)). In this case, the common variance method was applied, as suggested by Podsakoff et al. (2012). Harman's single factor test, which assumes that a large amount of variance comprised by a single factor may indicate potential common method bias

(Podsakoff et al., 2012). The test comprises an exploratory factor analysis with all independent and dependent variables. The results of this test showed that the first factor accounted for 19.35% of the observed variance, the expected value for this test being below 50%. This suggests that there is no problem of sample bias. From the initial results found, it can be said that the data is suitable for applying factor analysis. Other tests relating to reliability and validity are presented in the section on presentation and analysis of results.

4. Results and Discussion

4.1 Internal consistency, convergent and discriminant validity

The reliability (internal consistency) of the model was tested using the Cronbach's alpha (α), composite reliability (ρ_c) and average variance extracted (AVE) tests, shown in Table 1.

Table 1 – Cronbach's alpha (α), composite reliability (ρ_c) and Average Variance Extracted (AVE)

Dimensions	α	ρ_c	AVE
Organization Performance	0.910	0.928	0.649
Innovation	0.911	0.934	0.738
Knowledge Creation	0.876	0.907	0.621
Knowledge Transfer	0.794	0.861	0.557

Source: SmartPLS from survey data (2024)

For both tests, the results range from 0 to 1, with higher values indicating greater reliability. Both coefficients must exceed 0.7 (Hair et al., 2017). As shown in Table 1, the Cronbach's alpha values (α) range from 0.794 to 0.911 and the composite reliability values (ρ_c) range from 0.861 to 0.934, so all the indicators met the suggested levels. To determine convergent validity, the average variance extracted (AVE) was first calculated, as also shown in Table 1. The values for the constructs must be greater than 0.5 to be considered satisfactory (Hair et al., 2017). According to Table 1, all the values exceed the threshold, indicating convergent validity of the model. The following were used to assess the discriminant validity of the measurement model: the Fornell-Larcker criterion; the Heterotrait-Monotrait Ratio (HTMT) criterion and the cross-loading matrix (Hair et al., 2017), shown in Tables 2 and 3, respectively.

Table 2 - Fornell-Larcker criterion and HTMT

Dimensions	\sqrt{AVE}	Organization Performance	Innovation	Knowledge Creation	Knowledge Transfer
Organization Performance	0.805	1			
Innovation	0.859	0.630	1		
Knowledge Creation	0.788	0.739	0.617	1	
Knowledge Transfer	0.746	0.560	0.462	0.581	1
UL* (HTMT) 97.5%					
Organization Performance		1			
Innovation		0.676	1		
Knowledge Creation		0.827	0.685	1	
Knowledge Transfer		0.654	0.542	0.685	1

Source: SmartPLS from survey data (2024)

The evaluation of discriminant validity by the Fornell-Larker and Heterotrait-monotrait ratio (HTMT) criteria using the bootstrapping method (Table 3). For the square root criterion, the AVEs are higher than the correlations of the other dimensions (r_{ij} for $i \neq j$). As for the HTMT criterion, using the bootstrapping method for 5,000 subsamples, the upper limits for 95% confidence are less than 1. As both criteria have had their assumptions confirmed, the model has convergent validity, as shown in Table 3.

Table 3 - Cross Loads

Indicators	Organization Performance	Innovation	Knowledge Creation	Knowledge Transfer
CC_01	0.522	0.435	0.692	0.445
CC_02	0.446	0.368	0.678	0.358
CC_03	0.632	0.498	0.775	0.458
CC_04	0.628	0.524	0.838	0.482
CC_05	0.622	0.550	0.880	0.476
CC_06	0.616	0.516	0.842	0.512
DE_01	0.791	0.502	0.543	0.401
DE_02	0.809	0.583	0.541	0.435
DE_03	0.850	0.500	0.615	0.438
DE_04	0.852	0.505	0.641	0.468
DE_05	0.815	0.485	0.646	0.462
DE_06	0.708	0.339	0.562	0.471
DE_07	0.804	0.575	0.629	0.498
IN_01	0.455	0.785	0.482	0.334
IN_02	0.509	0.881	0.520	0.405
IN_03	0.552	0.904	0.547	0.428
IN_04	0.546	0.885	0.543	0.369
IN_05	0.626	0.836	0.552	0.438
TC_01	0.196	0.293	0.186	0.555
TC_02	0.400	0.352	0.383	0.795
TC_03	0.473	0.350	0.524	0.814
TC_04	0.469	0.349	0.478	0.803
TC_05	0.510	0.371	0.548	0.734

Source: SmartPLS from survey data (2024)

We can then move on to analyzing the Structural Model

4.2. Evaluation of the Structural Model

The structural model describes the relationships between the constructs (HAIR et al., 2017). The first step is the assessment of multicollinearity was carried out using the Variance Inflation Factor (VIF), in which the values were less than 5 (HAIR Jr. et al., 2017), confirming that there is no multicollinearity. The size of the f^2 effect was also checked, whereby if f^2 is within ($0.02 \leq f^2 \leq 0.075$) it is considered a small effect, if it is between ($0.02 \leq f^2 \leq 0.075$), medium effect ($0.075 \leq f^2 \leq 0.225$) and large effect ($f^2 > 0.225$), are shown in Table 4.

The constructs Knowledge Transfer \rightarrow Innovation $f^2 = 0.027$, which can be considered to have a small effect, i.e. ($0.02 \leq f^2 \leq 0.075$), Knowledge Creation \rightarrow Innovation $f^2 = 0.305$

and the relationship Innovation → Organization Performance, $f^2 = 0.660$, with $f^2 > 0.225$, are considered to have a large effect.

Table 4 - Collinearity statistics (*VIF*) and Effect Size (f^2)

Relations	<i>VIF</i>	f^2
Innovation → Organization Performance	1.000	0.660
Knowledge Creation → Innovation	1.509	0.305
Knowledge Transfer → Innovation	1.509	0.027

5. Source: SmartPLS from survey data (2024)

The explanation coefficient and predictive relevance are shown in Table 5.

Table 5 - Explanation coefficient (R^2) and Predictive relevance (Q^2)

Endogenous dimensions	Explanation coefficient		Q^2
	R^2	<i>p</i> values	
Organization Performance	0.397	0.000	0.432
Innovation	0.397	0.000	0.372

Source: SmartPLS from survey data (2024)

Table 5 shows the R^2 explanation coefficients, whose values are higher than 0.031 and significant ($p < 0.05$), i.e. they show effects in the weak to strong range. As for the prediction values $Q^2 = 1 - (SSE/SSO)$, where: SSO = Sum of Squares Observed, SSE = Sum of Squares of Errors, it can be seen that the model is relevant, as the Q^2 values are greater than zero and greater than 0.016, i.e. indicators classified as moderate to strong (HAIR et al., 2017).

4.3 Hypothesis testing

The proposed hypotheses, the structural coefficient (β), the t-test and the p-values are shown in Table 6.

Table 6 - Knowledge creation has an influence on innovation.

Hypotheses	Path coefficients (β)	t statistics ($ O/STDEV $)	<i>p</i> values
Knowledge Creation → Innovation	0.526	7.311	0.000
Knowledge Transfer → Innovation	0.157	2.016	0.044
Innovation → Organization Performance	0.630	13.879	0.000

6. Source: SmartPLS from survey data (2024)

The analysis of knowledge creation on innovation showed a positive and significant impact with $\beta = 0.526$ and p-value = 0.000, leading to the acceptance of H_2 , i.e. knowledge creation is a significant predictor of innovation. This result is in line with (Liu & Wang, 2020; Nonaka & Takeuchi, 1995; Teece, Pisano, & Shuen, 1997).

Knowledge transfer has a positive and significant impact, with $\beta = 0.157$ and p-value = 0.044, on innovation, thus H_3 is accepted, i.e. knowledge transfer is a significant predictor of innovation. This result is in line with (Casson et al., 2009, Lane & Lubatkin, 1998; Torres et al., 2015; Mirvis et al., 2016; Qin et al., 2017; Liu & Wang, 2020).

The analysis of innovation on Organization Performance showed a positive and significant impact with $\beta = 0.630$ and p-value = 0.000, leading to the acceptance of H_1 , i.e. innovation is a significant predictor of Organization Performance. This result is in line with

the findings of (Porter, 1990; Drucker, 1985; Tidd, Bessant, & Pavitt, 2001; Schilling, 2013; Damanpour, 1991). All the direct hypotheses were confirmed.

Table 7 shows the indirect relationships, i.e. Knowledge Creation has a positive impact on Innovation which has a positive impact on Organization Performance, with $\beta = 0.332$ and $p\text{-value} = 0.00$, thus H_4 is accepted. These results are in agreement with (Inkpen & Tsang, 2005; Nonaka & Takeuchi, 1995; Tsai, 2001).

Knowledge Transfer also has a positive impact on Innovation, which has a positive impact on Organization Performance, with $\beta = 0.199$ and $p\text{-value} = 0.001$. These results are in agreement with (Nonaka & Takeuchi, 1995; Cohen & Levinthal, 1990; Zahra & George, 2002). All the indirect hypotheses were also confirmed.

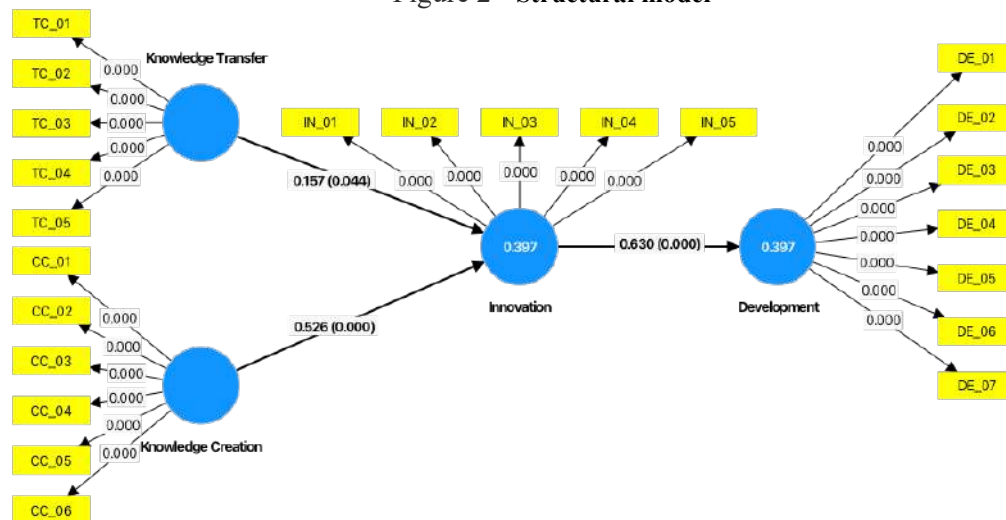
Tabela 7 - Testing indirect hypotheses

Hypotheses	Path coefficients (β)	T statistics ($ O/STDEV $)	p values
Knowledge Creation \rightarrow Innovation \rightarrow Organization Performance	0.332	5.783	0.000
Knowledge Transfer \rightarrow Innovation \rightarrow Organization Performance	0.199	2.954	0.001

Source: SmartPLS from survey data (2024)

The structural model is shown in Figure 2.

Figure 2 - Structural model



Source: SmartPLS from survey data (2024)

5. Final Considerations

This study aimed to verify the influence of knowledge creation and transfer on innovation and its impact on organizational performance in the grape production chain in the state of Rio Grande do Sul. Todas as hipóteses diretas e indiretas foram confirmadas, ou seja:

This study aimed to verify the influence of knowledge creation and transfer on innovation and its impact on organizational performance in the grape production chain in the state of Rio Grande do Sul. All the direct and indirect hypotheses were confirmed.

The direct hypotheses, i.e. Knowledge Creation influences innovation ($\beta = 0.526$), Knowledge Transfer influences innovation ($\beta = 0.157$); innovation influences organizational performance ($\beta = 0.630$) and the indirect hypotheses, i.e. Knowledge Creation influences innovation and Organization Performance ($\beta = 0.332$), Knowledge Transfer influences innovation and Organization Performance ($\beta = 0.199$), were accepted.

This study resulted in a representative model of the influence of Knowledge Creation and Transfer on Innovation and the Impact on Organizational Performance in the grape production chain, in the producers' link in Rio Grande do Sul, Brazil. The three latent variables (knowledge creation, knowledge transfer and product innovation) explain 39.70% of the formation of organizational performance. This leaves a gap for future studies to find other variables that can explain the missing 60.30%.

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INNOVATIONS IN THE RELIGIOUS TOURISM SECTOR: A SYSTEMATIC REVIEW

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ABSTRACT

Brazil is a country with enormous territorial and population size and, consequently, with cultural and religious diversity. From a religious point of view, it has a large percentage of the population with a religion linked to Christianity. This attitude demonstrates that the country is very religious and has diverse religious manifestations as a means of getting closer to something sacred. Therefore, this study aims to analyze studies on innovations in the religious tourism sector. As methodological aspects, methods with a qualitative approach were used, with technical bibliographic procedures and with a basic nature; systematic literature review methods were also used. In the theoretical framework, studies on religious tourism, religious tourism in Brazil and the innovations present in this sector were addressed. Finally, as a result, it was found that tourism is important for people to get out of their daily routines, for integration between peoples and cultures and enables the generation of peace. Furthermore, it is noted that technology plays a role in publicizing religious events and allows the exploration of greater experiences for the sector. Moreover, holding religious festivities is essential for generating income and revenue for local economies.

Keywords: Tourism; Religious Tourism; Innovation.

1 INTRODUCTION

Brazil is a country that presents a great diversity of religious manifestations among the population, such expressions are very important because they are means by which people connect to something Sacred and Superior, in other words, it is a link of communication. In this way, the great strength of religiosity is understood, as Sousa (2013) points out that 90% of Brazilians have a religion linked to Christianity.

Religion is deeply linked to the history of Brazil and with the arrival of the Portuguese in 1500, it was possible to see the beginning of Catholicism in the country, which includes the catechization of indigenous peoples (SOUSA, 2013, p. 285). This shows that religious manifestations come from a long historical tradition that continues over time in a hereditary manner through generations.

With such religious beliefs, it is notable the emergence of several festivities that attract a large number of believers to follow them. Therefore, this movement of people to attend a religious event allows tourism to occur, that is, it is the moment when participants in such ceremonies meet to understand and get to know each other better, by having a proximity to a Superior Being (SILVEIRA, 2007, p. 35).

From the above, it is clear that with the aforementioned religious manifestations it is possible to explore the religious tourism segment as a business idea to offer pilgrims. Since, according to the Ministry of Tourism (2021), 344 Brazilian municipalities have tourist attractions and in 176 of these, they have religious celebrations throughout the year. Therefore, it is clear that residents of these regions can use such events to generate income.

However, in regions with religious tourism, the services provided and the products sold are generally similar to each other without much distinction. This becomes a problem for business, since, therefore, for the consumer it will not make any difference to buy from one establishment or another and from an administrative point of view it does not bring advantages.

In this field, it is necessary to understand what differentiates one enterprise from another, given that the segment is the same, what will change will be the way in which entrepreneurs present themselves to consumers. As stated by Tavares, Salvador and Mores (2014), innovations in tourism are mainly linked to technology, as it is the way in which most customers communicate. Thus, innovation is essential to create a competitive difference between commercial establishments, as they are competing for the same customer segment.

Innovation in business is important so that customers do not get used to it and lose interest because they have already used it several times in the same way. Therefore, when talking about innovation, it refers to anything in a business that is more updated than the previous one and is not always the same (REICHERT; CAMBOIM; ZAWISLAK; 2015, p. 163). In addition, according to Reichert, Camboim and Zawislak (2015, p. 165), “[...] other

efforts for change and novelty must be considered, such as product adaptations, new operational arrangements, adjustments in management practices or new marketing techniques.

Thus, this study presents the theme “religious tourism sector: what are the main innovations found?”, that is, through the literature review, it aims to generally analyze studies on innovations in the religious tourism sector. Furthermore, specifically, it aims to search for articles on the Spell platform in April 2022; select articles using systematic review methods; and showcase the main innovations in that sector.

In this sequence, the creation of the article arises from the following problem: “what are the main innovations reported in the religious tourism sector reported in the literature from 2012 to 2022?” Furthermore, the research is justified because, according to the Ministry of Tourism (2021), there are 176 Brazilian municipalities that, during the year, hold religious festivities. Such events attract a large number of people, making it possible for local entrepreneurs to generate income by selling products or services associated with the celebration. Furthermore, it is pointed out that there is a need to know what innovation exists in the sector so that it can be implemented to have a competitive advantage.

According to the methodological aspects, it is clear that the approach is qualitative, with technical bibliographic procedures and basic in nature. Using these methods, articles will be collected from the Spell platform that present themes related to innovations associated with religious tourism.

Theoretically, it will address themes that address religious tourism in general, religious tourism in Brazil and the innovations found in the sector. Thus, religious tourism is cited as the attitude of going to sacred places because of faith and devotion (SILVEIRA, 2007). In Brazil, there are several places that are highly visited religious destinations, such as Aparecida, Juazeiro do Norte and Belém do Pará for the Círio de Nazaré (ABUMANSSUR, 2018). Innovation is related to everything that is modified and in which there is an improvement (AUDY, 2017).

This article consists of this section—part one—with the introduction of the topic to be discussed during the study. The second part presents the methods that will be used; the third will show the main definitions found in the literature, the theoretical framework. In the fourth and fifth sections, the main research findings will be presented, organized in a table and then in

a brief contextualization; and considerations, respectively. In addition to the bibliographic references used in the article.

2 METHODOLOGY

Prodanov and Freitas (2013, p. 24) define a method as being “a procedure or path to achieve a certain end [...]”. In this way, means are established that use some techniques with the aim of obtaining scientific knowledge (PRODANOV; FREITAS, 2013, p. 25).

From the point of view of approaching the problem, it is a qualitative study, since, according to Marcondes *et al* (2017, p. 60), “this method comprises the collection, treatment and analysis of data using techniques”. Thus, it is a study that focuses on obtaining a quantity of information in an open manner and, therefore, selecting those that are related to the study.

In relation to technical procedures, the study is bibliographic in that it searches the literature for articles in order to produce a result. Thus, Prodanov and Freitas (2013, p. 54) point out that it is a bibliographical study “when prepared from already published material, consisting mainly of: books, magazines, publications in periodicals and scientific articles[...]”.

The study is basic in nature, since, as Prodanov and Freitas (2013, p. 51) state, it does not present practical application at the time of preparation. From this perspective, it is presented with the aim of providing knowledge that can be analyzed and applied in generalist cases.

This study is characterized as a systematic literature review article, since, according to Galvão and Pereira (2014, p. 183) “systematic reviews are considered secondary studies, which have primary studies as their source of data.” In this instance, it is understood that reviewing the literature is bringing to light several publications on a defined topic.

At this juncture, the theme for study was initially defined as “Religious Tourism Sector: what are the main innovations found?”. Following the decision to research this topic, it was decided that a search for articles would be carried out on the Spell platform, as it is a well-recognized database and has many publications.

To select articles in the Spell database, the word “Turismo” (Tourism) was used as a search strategy, adding the field “e” (and) and then “Religioso” (Religious), with the search

selection for “Document title”. When doing this, 17 results were found, however, when applying the filters: year of publication from 2012 to 2022; document type “article”; area of knowledge “Administration” and “Tourism” and; Portuguese language, there were 12 articles.

Furthermore, each result found after the filter was checked to see if the article really fell within the defined topic. Therefore, when opening the file, the title was checked for a match, then the keywords and the abstract, respectively.

After this initial analysis, of the 12 pre-selected articles, 9 remained in accordance with the objectives of this study. Accordingly, the selected studies were downloaded onto a memory card inserted into a notebook. To this end, this process took place in April 2022.

3 THEORETICAL REFERENCE

From the point of view of theoretical aspects, this systematic review article will address important concepts present in the literature regarding religious tourism, religious tourism in Brazil and the innovations present in that sector.

3.1 Religious Tourism Segment

According to Grünewald (2003, p. 141), tourism “is generally about visiting places where the most varied practical and/or subjective activities can be carried out as long as it is not for work”. In this way, it is understood that the act of tourism works as an activity to rest from the work routine, hence, Ignarra (2020, p. 14):

Tourism is the combination of activities, services and industries that are related to the completion of a trip: transport, accommodation, food services, shops, shows, facilities for various activities and other receptive services available to individuals or groups traveling. It encompasses all service providers for visitors or those related to them (IGNARRA, 2020, p. 14).

Normally, when practicing tourism it is necessary to move from one region to another which has something to offer, that is, there needs to be a good reason for a person intending to break out of their routine to look for a certain place to visit (FARM; BALEIRO, 2017). At this juncture, specific aspects of the locations come into play and become essential to attract a greater number of visitors and, thus, consequently enable an increase in revenue in these cities (IGNARRA, 2020).

It is true to point out that, according to Silveira (2007, p. 36) “religious tourism, an ancient social practice, in times of globalization and deterritorialization, consists of visiting

places considered sacred, using the structure of accommodation”. Thus, we observe the existence of two sides, as is the case of entertainment—tourism in itself—and the connection to religion—devotion—(SILVEIRA, 2007, p. 36), however, such festivities are of great relevance to the people who seek them.

According to Almeida and Pinto (2017, p. 620), when thinking about tourism, it is considered a set of activities and values, since tourism is something linked to people's individuality, but it is clear that it is lasting and refers to the customs of the communities. Thus, according to Santos (2015, p. 4) “there is no tourism without population”, this demonstrates that it is not only the tourist who becomes important, but also the people who are present locally (SANTOS, 2015, p. 4).

Religious tourism is the association between the act of people traveling to places considered sacred or of a religious nature in order to know, understand and seek a connection with deities. For this, such movements were made possible by the existence of the most varied means of dissemination, which were made possible due to the advent of the Internet (COBRA, 2001).

At this juncture, it is clear that religious tourism is a major attraction for people even in small towns, and there is no distance too far for faith (SILVEIRA, 2007, p. 40). From this point of view, it must be noted that to participate in these festivities, the faithful generally arrive at the places through large pilgrimages as a way of paying a promise for a grace achieved (MAIO, 2004, p. 54).

With the attraction of a large number of visitors to a religious place or event, it is clear that there is an opportunity for the development of that region (SILVA; MARQUES JUNIOR, 2016, p. 500) and this becomes essential for entrepreneurs in the tourism sector and trade associated with tourist products or services. However, an important characteristic pointed out by Vieira (2001, p. 126) is that religious tourism is normally seasonal, this factor indicates that businesses associated with the activity will have moments of “ups” and others with “downs”.

3.2 Religious Tourism in Brazil

According to information from the Globo news portal, G1 (2020), through a survey carried out by the Datafolha institute in order to find out about the religion of Brazilians, it is pointed out that 50% of those interviewed are Catholic and 31% evangelical. Therefore, this

shows that the country is essentially religious, so it is possible to affirm that there is a huge potential for demonstrations linked to religion.

Data found in the annual report of the World Travel & Tourism Council (WTTC, 2021) showed that Brazil is in 11th (eleventh) position worldwide in relation to the tourism market (MINISTÉRIO DO TURISMO, 2022). Furthermore, it also demonstrates that Brazil showed large movements in the national territory motivated by religious tourism, generating 6.4% of the sector's global GDP in 2021 (MINISTÉRIO DO TURISMO, 2022), thus, indicating that this segment is very strong in the country.

Moreno (2015, p. 1871) states that the World Youth Day that took place in 2013 attracted a huge number of people to participate in the event and that the Brazilian public sector spent 118 million reals. However, with the religious event, it was found that tourists generated around 1 billion and 800 thousand reals.

In Brazil there are several cities named after saints, generally the patron saint of that place, such attitudes demonstrate homage to the faith in a saint who presents an important history for the region. Thus, in the country there are large sanctuaries that were built due to religious devotion, such as that of Our Lady of Aparecida, patron saint of Brazil, in the city of Aparecida in São Paulo (ABUMANSSUR, 2018). After checking the extent of the patron saint's celebration, G1 (2022) affirmed in the year 2022 that the church dedicated to the saint has the capacity to receive 35 thousand faithful per mass.

Thus, it is stated that in Brazil, according to the Ministry of Tourism (2011), there are 344 cities in which there are places with religious tourism. At this juncture, it is worth highlighting some places and/or events well known for their religious tourism, such as Aparecida in São Paulo with the National Sanctuary of Aparecida, Belém with Círio de Nazaré, Juazeiro do Norte with tributes to Father Cícero, among others with great religious importance (ABUMANSSUR, 2018, p. 99). Accordingly, Moreno (2015) points out that the aforementioned regions have already been identified as one of the most important in religious tourism, given their great capacity to attract visitors (MORENO, 2015).

Brazilians greatly demonstrate their faith through the religious expressions that exist in the territory, as they are vast, as is the case with masses, processions and pilgrimages—for Catholics—and in various places across the country (ARAGÃO, 2014). Such religious activities that take place in a given location always have a history that began many years ago

and is always passed from generation to generation, that is, it is part of the culture of that region (MORENO, 2015, p. 1867).

Participation as a form of financial support from companies, which provide resources through sponsorship, and public bodies, through cultural incentive laws, in addition to the churches themselves, is well known for the implementation of religious festivities (MORENO, 2015). Therefore, with greater support for holding events, it is essential to highlight that it facilitates, according to Aragão (2014), the movement of people to the location. Furthermore, it must be noted that the greater the number of believers, the greater the return to the city, as these are essential activities for local companies (TAVEIRA; BON, 2022, p. 35).

3.3 Innovation in the Religious Tourism Segment

Innovation does not concern inventing a new product or service, which is the act of creating something that does not yet exist (CARVALHO; REIS; CAVALCANTE, 2011) but rather modification to something already known through the use of techniques, or that is, a different way of doing or achieving a final result (AUDY, 2017). It is understood, then, that innovation is something that emerged and was implemented, that is, it is in operation, for the first time (LAGARTO, 2013).

Innovation is not just improving a product that already exists, but can also be associated with processes, services and any attitude or object that differs from the initial one (CARVALHO; REIS; CAVALCANTE, 2011). For this, it is necessary to point out that the distinction between invention and innovation is that innovation is present in something that already exists, while invention is the initial creation of something that never existed (CARVALHO; REIS; CAVALCANTE, 2011).

Thus, such innovations are evident in the religious tourism sector, since without something that differentiates one business from another, it is not possible to obtain a competitive advantage. As a way to innovate in this segment and achieve better advantages, it is essential to point out the role of local production arrangements, such as that of Juazeiro do Norte (MOSINHO; MOREIRA, 2012).

Furthermore, according to the study by Mosinho and Moreira (2012), it is understood that for a Local Productive Arrangement (LPA) to be successful, it is necessary to integrate companies in the sector toward a common goal. Events are fundamental for local economic

development (MAGALHÃES et al, 2012), therefore, productive arrangements must be structured to form a unit.

For this reason, regions that realize the value of religious tourism for their economy, seek to strengthen such festivities in order to be more successful (GUILLAUMON, 2011). Furthermore, it is understood that the operationalization of tourism or religious tourism, in order to be more effective, requires the participation of governments and the private sector (GUILLAUMON, 2011, p. 4).

An innovative action for this segment is the customization of products and services specific to the region and the event to market to tourists and visitors (GUILLAUMON, 2011). Thus, the offer of these products and services is important for attracting people to shop and this allows for better revenue generation for the location (MOSINHO; MOREIRA, 2012).

4 RESULTS ANALYSIS

Below, in table 1, are the main results of the articles analyzed. Afterward is a brief contextualization of the findings.

Table 1 - Main findings from the literature review

ARTICLE TITLE	AUTHOR/ YEAR	GOAL	METHODOLOGY	MAIN FINDINGS
A utilização dos espaços sagrados pelo turismo religioso e suas possibilidades como ferramenta auxiliar para o estabelecimento do diálogo entre as nações	JALUSKA; JUNQUEIRA/2012	Reflect on the use of sacred sites for religious tourism; motivation for tourism; and verify the possibility of helping with peace.	Bibliographic-qualitative research (using technical books).	Important for physical and mental health, as it seeks to escape the everyday rush; serves to unite the sacred and the profane, to learn about new cultures, enabling integration and unity between different peoples, as it attracts followers or non-followers of the aforementioned religion and people without religion to learn and respect other people's choice; awakens tourists' interest in consuming local products, favoring economic and sustainable development; religions "encourage" tourism through advertising religious events and places.
Turismo religioso: estudo do impacto econômico do Círio de Nazaré na cidade de Belém, Pará	SILVA <i>et al</i> /2014	Verify the income generation potential that tourism in Círio de Nazaré provides to Belém - PA.	A descriptive statistics tool was used to analyze means and frequencies referring to the survey of reports issued by DIEESE - PA from 2007 to 2012.	Currently, tourists, in addition to participating in the religious festival, want to visit places related to the festival; each year that passes the Círio de Nazaré attracts a greater number of tourists to the point of being considered a "Star Product", since, when compared to the first year analyzed, the last one had an increase of 10 thousand tourists and with a value of 5 million dollars injected into the state's economy in the years under analysis; it is clear that a large expense is incurred for the religious festival, however, the return to the economy is much higher than what was spent.
O turismo religioso e o processo de	ARDIGÓ; CAETANO;	In general, it is to analyze marketing	Exploratory and descriptive research,	The Santa Paulina Sanctuary has an official website, a page on Facebook, Twitter and Flickr, broadcasts

comunicação de marketing: um estudo do Santuário de Santa Paulina em Nova Trento - SC	DAMO/2016	communication at Santuário Santa Paulina; and specifically it is to describe who produces the communication and who receives it, identifying the messages sent and by what means, and the impacts produced on the message receiver.	with a qualitative approach (by observation, survey, interview) and quantitative approach (descriptive statistics by frequency distribution, mean and standard deviation)	on TV Aparecida and Rede Século 21, local radio stations, advertisements in newspapers in the region; however, the services of an advertising agency are not used, but rather marketing is done by a person from the Sanctuary; the highest percentage of tourists/visitors is from the Brazilian region (south); more than 80% of visitors are women; regarding age group, 30.9% are between 50 and 59 years old; the motivation for traveling is religion with 61.1% and leisure with 53.7%; in relation to the communication methods used, the website and fan pages reached more people between 15 and 29 years old; radio, newspapers and magazines stood out for those from 30 to 39 years old; and television has reached more people aged 60 and over; however, it is clear that such communication actions are not attracting potential tourists or tourists from more distant locations.
Turismo e Tecnologia: Qualificando a Experiência do Turista Religioso	RAMOS; RODRIGUE S/2017			Use of technological tools adapted to different places in order to create a new type of tourism, for this it is necessary to integrate mobile devices, gamification, social networks, location-based systems and intelligent interfaces; this will encourage companies to explore more activities and provide better experiences for tourists.
Turismo e Trabalho: Uma Análise do Destino Religioso Santa Cruz – RN	SILVA; SILVA/2017	In general, it aims to understand the influence of tourist activity on the formal and informal market of Santa Cruz - RN.	It presents a qualitative approach, with interviews with a semi-structured script; the data were treated using Bardin's content analysis technique; was carried out from	It was found that there was no increase in the hiring of employees in the city's tourism sector, with the exception of the period of religious celebrations; businesspeople (interviewed) pointed out that tourism did not have a strong impact on business, as they state that the city does not have activities that make visitors stay in the city more (visitors only go for the festivities and come back); it was noted that in the city

			July to November 2015.	of Santa Cruz; in relation to informal employment, only one company analyzed still has employees in this condition, however, the others only have employees formally; among the 50 informal workers—analyzed—in the municipality, 38 are women; 57% of informal workers develop another activity to supplement their income, followed by 43% who live solely from tourism; for 51% of informal workers, the reason for their situation is the lack of employment, while for 40% it was due to opportunity; most of these workers sell simple and common products that are purchased elsewhere, and they earn an income of up to the minimum wage; workers who sell more varied products earn an income of 1 to 2 times minimum wage.
Festa de Padroeiros: cenários de Turismo Religioso no Estado de Goiás (Brasil)	CURADO; D'ABADIA/ 2018	It aimed to show the importance of patron saint festivals as cultural and tourist heritage.	Bibliographical research, experience, photographic productions and field interviews.	Devotion to patron saints date back to the colonization of the territory; after choosing the patron saint, commemorative activities are created; during events it is possible to see the integration of people who do not see each other on a regular basis; there is a creation of a culture based on religiosity; scenery is produced to carry out the festivities; such events attract a large number of people; on the day of the patron saint of a city in Goiás, the festive city becomes the state capital for a day; the public authorities have a website that presents some characteristics of the main tourist attractions;
Turismo religioso como fonte de desenvolvimento local: um estudo acerca da produção do	ALMEIDA; ENOQUE; OLIVEIRA JÚNIOR/2019	To encourage reflection between religious tourism and urban space, its importance for	Bibliographic analysis	Enables the joining of different cultures; increases consumption and the supply of jobs, as more sales points are created; two aspects: positive, bringing good results for the local economy, and negative, concern regarding ecological preservation;

espaço urbano a partir da prática turística religiosa		culture and economy and to highlight local transformations.		presentation of sustainability and innovation strategies brings competitive advantage; photo posts are considered a means of promoting tourist attractions; such well-used marketing actions make visitors return to the city later; there is an interference in the space of cities, as it becomes necessary to increase religious spaces, houses are rented for celebrations, there is a diversity of products; companies use pilgrimages to advertise their companies.
Perspectivas para o desenvolvimento de Turismo Religioso em Armação dos Búzios – RJ	COSTA; FERREIRA/ 2019	It aimed to “understand how tourist and religious experiences and meanings are elaborated and articulated in the social construction of these modern pilgrimages”. It refers to religious tourism in Armação do Búzios - RJ, in visits to the Church of Nossa Senhora Desatadora de Nós.	Qualitative research, based on ethnography, direct observation and interviews.	Even though the majority of the city's population is not Catholic, the city has a chapel dedicated to Our Lady Undoer of Knots; receives hundreds of faithful for celebrations and around 156 thousand people visit the church each year; there is the presence of buses and caravans with people from neighboring cities; it was found that not all religious tourist sites are available for the faithful to visit; the municipal government does not invest and does not focus much on this activity, even though it is included in the Tourism Master Plan; the study found that the church has good places for taking photos and also for ceremonies such as weddings; in the parish there is no position/person/sector that is responsible for exploring tourism.
Marketing e turismo religioso: perfil e	BISPO; LODI;	The study aimed to identify the	Qualitative and quantitative study	The profile of visitors is: 75% aged 36 to 65 years, 73% are women, 47% of visitors are married or in a

<p>satisfação dos visitantes das obras da primeira santa brasileira</p>	<p>SPINOLA/2020</p>	<p>profile and satisfaction in relation to visiting the memorial, sanctuary, store and café of OSID (Obras Sociais de Irmã Dulce).</p>	<p>carried out in August 2019 at OSID with the application of questionnaires to tourists and residents of Salvador; to determine satisfaction, the Net Promoter Score methodology was used.</p>	<p>stable relationship and 38% are single, 30% have higher education, 27% secondary education and 24% elementary education, in relation to income, more than 24% indicated that it was up to 1 minimum wage, followed by more than 22% with income above 8 times minimum wage; more than half (55%) of tourists are from other cities and states, of which almost 33% said they went for religious tourism, while almost 28% went for leisure; 46% presented devotion to Santa Dulce dos Pobres as their motivation and 42% wanted to know more about the saint; almost 18% of visitors were accompanied by children; 55% took their own car or carpooled; 48% learned about the sanctuary through reports and nearby residents, 30% through recommendations and 15% through tourism agencies; from data analysis it is clear that the location, physical structure and quality of the information provided were well evaluated, while parking, café prices, nearby security and accessibility are aspects to be improved.</p>
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Source: Silva (2022)

After analyzing the articles mentioned above, immediate benefits can be seen for the populations of places known for presenting religious tourism. Thus, it can be understood that this practice is very important for local development and provides better income for traders.

Initially, according to Jaluska and Junqueira (2012), tourism allows people to leave their daily routines in search of diversion and fun, as well as allowing greater interaction between different cultures and peoples, enabling people from a given region to have a moment of proximity (CURADO; D'ABADIA, 2018).

This is evident when noting, according to Costa and Ferreira (2019), that the city of Armação dos Búzios in Rio de Janeiro receives more than 150 thousand people each year to visit the chapel of Our Lady Undoer of Knots.

In this way, religious tourism attracts a large number of people who are looking for greater proximity to the sacred (JALUSKA; JUNQUEIRA, 2012) and this leads to large religious events being held, as according to Silva et al (2014) in the festival dedicated to Our Lady of Nazareth, known as the Círio de Nazaré, each year there is a noticeable increase in the number of believers. Such festivities are essential for local economic development, especially for those who do not have formal employment, to earn an income during such events (SILVA; SILVA, 2017).

In this framework, the practice of tourism linked to religion generates good job opportunities, at least during the event period (SILVA, SILVA; 2017). Similarly to this, it is demonstrated at the Círio de Nazaré in Pará, where according to Silva et al (2014), the return to the state's economy is much higher than the expenditure incurred in holding the event.

Thus, according to Silva and Silva (2017), it is noted that for there to be a greater impact caused by religious tourism on the economy, it is necessary that there be attractions in cities also provided by other sectors, in order to make visitors stay more time in the city. With more time spent by visitors in such places, it is possible that it will be necessary to hire more employees to serve consumers more efficiently, that is, there will be a greater supply of jobs (ALMEIDA; ENOQUE; OLIVEIRA JUNIOR, 2019). Therefore, the study by Ramos and Rodrigues (2017) points out that a factor that helps a lot is the use of technology as a means of better exploring tourism.

Unlike what has already been said, Almeida, Enoque and Oliveira Junior (2019) indicate two aspects that are a consequence of tourism, one is positive and the other is negative. From a positive point of view, this movement of people to places where such festivities are held

generates good results for the local economy, however, a negative factor in this is the ecological issue, as it could lead to problems for environmental preservation areas.

To define the means by which events will be publicized, it is essential to know who the target audiences are for each festival. Thus, Bispo, Lodi and Spinola (2020) point out that the majority (75%) of visitors to OSID (Obras Sociais de Irmã Dulce) are aged between 36 and 65 years old, and that 73% are women, in addition to another 50% of visitors being from other cities and/or states.

With the study by Ardigó, Caetano and Damo (2016) it was noticeable that to publicize religious events at the Santa Paulina Sanctuary, the following are used: website, Facebook page and Flickr, broadcasts on TV networks Aparecida and Rede Século 21, as well as advertisements in local newspapers. From this perspective, technological means enable greater reach of people through event promotion, that is, there is a greater chance of the event becoming better known to more people.

4 FINAL CONSIDERATIONS

This article on the main innovations found in the religious tourism sector aimed, through systematic literature review methods, to generally analyze studies on the theme of innovation in that sector. To this end, 9 scientific articles were selected from the Spell database dated from 2012 to 2022.

At this juncture, it is considered an expected result that religious tourism is very important for the local economy, especially with regard to generating extra income, increasing the number of jobs and greater revenue for companies, as pointed out in studies by Jaluska and Junqueira (2012), Silva *et al* (2014), Silva and Silva (2017) and Almeida, Enoque and Oliveira Junior (2019).

It is noted that religious events are essential for the economy of the cities and states to which they belong, since changes are made both structurally and in the daily routines of these cities. Under this perspective, such locations are in many cases small towns with little movement of people on "common days", but during the period dedicated to the festival, there is a large movement of people.

In this field, it is true to point out that people who are going to participate and/or attend the religious event are looking for a greater connection with a Superior and Sacred Being. Thus, such faithful like to have objects related to the festival and that serve as souvenirs, which is why traders who sell products specific to that occasion come to the fore, as this attracts the faithful. Therefore, these purchases increase the establishments' revenue, providing better conditions for the people involved.

In view of the above, it is necessary to carry out a good publicity campaign and to do so, you must know the specific audience and through which means of advertising it is easiest to reach them. Therefore, the use of technology as a way of exploring religious tourism is seen as having great innovative potential, since, in addition to segmenting the public most likely to participate, it can be used as a differentiator. So, this becomes visible when local business owners can use it to provide tourists with more realistic experiences.

As shown in studies on the profile of visitors to certain events, it is important to know that the majority of people who go to the festivities are accompanied by other people. Therefore, by discovering the escort's profile, businesspeople in the tourism sector can devise strategies that also impact these people, thereby certainly having more visitors willing to spend.

Another point that deserves to be highlighted is that, as previously mentioned, religious festivals manage to attract a large number of believers to the place, however, these visitors only stay in the city during the period of religious celebrations and return to their origins, something that, from the business point of view, does not bring benefits. Therefore, there must be a countereffort from businesspeople and also from public authorities to generate attractions that keep people in the city for longer, in other words, it is important to use the opportunity to offer services that attract the attention of tourists.

From the studies analyzed, it was clear that this article achieved its objectives by discovering some innovations related to the religious tourism sector. However, it is suggested that for future research, the theme and objectives be limited to business only, that is, to examine practical cases of innovations that become a competitive differentiator for establishments.

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IMPACTS OF TECHNOLOGY USE ON PAYROLL MANAGEMENT: A CASE STUDY APPLIED TO CLIENTS OF NA ACCOUNTING OFFICE IN SERRA GAUCHA

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Abstract

Payroll tasks require time and sometimes repetitive practices. Technology is a mandatory item for these tasks to be carried out quickly, safely and reliably. This work aims to analyze the impacts of using technology applied to payroll management for clients of an accounting office in Serra Gaúcha. The methodological procedures adopted in this research characterize it as a case study, with a qualitative and descriptive approach in relation to the established objectives, with data collection carried out through a question form applied to clients of the office in question. In the results it was observed that in the work of professionals in the personnel department, the integration of technology can contribute to improving quality due to the quantity of demands. To this end, the software used and the reasons why customers use or do not use each of them are identified. It is concluded, through the case study, that technology has a lot to add to the daily lives of both parties. However, some technological difficulties persist in relation to data integration with the office, such as access to technology or cost-benefit ratio.

Keywords: Technology. Personal department. Automation..

1. Introduction

In today's global scenario, it is essential for accounting professionals to be aware of technological innovations and to be willing to adopt new systems. Undoubtedly, accounting plays a fundamental role in providing valuable information for decision-making both inside and outside companies. The new challenge for many professions is to understand and keep up with the changes the market is experiencing. Continuous updating has become indispensable for professionals to remain competitive in the workplace (Bicca & Monser, 2020).

Digital accounting is a business model that uses information technology to automate accounting processes, thus providing greater simplicity, convenience and lower costs. It has emerged as a response to new markets and demands for more efficient services, bringing accountants closer to clients and adding value to the service provided. In general, the digital accounting model involves specific characteristics that depend mainly on the integration of data between the client and the service provider (Benedetti, Feltrin, & Oliveira, 2018).

The current economic and social scenario requires accounting professionals to constantly look for new developments and updates, creating a profile of the modern accountant as a professional with technical knowledge and creativity, a capacity for innovation, flexibility and negotiation skills. The accountant's work also involves understanding political, social and financial realities. Constant updating and mastery of new working tools are essential for success in the profession. In addition, it is necessary to have knowledge of information systems and be familiar with the technology applied to the accounting area (Silva et al., 2021).

Accounting stores company transactions in a system that is integrated with all areas. The Accounting Information System (CIS) is a set of activities, documents and technologies that collect, process and report information to internal and external decision-makers in organizations. A common subsystem is payroll, which can be automated to optimize processes and reduce costs by allowing an analytical approach to figures related to human capital and decentralizing processes, enabling assertive decision-making and a focus on strategic issues (Xavier, Carraro, & Rodrigues, 2020).

In view of this important issue, we wanted to delve deeper into it and the research problem was presented as follows: What are the possible impacts of using technology to manage the payroll of clients of an accounting firm in Serra Gaúcha? To this end, we sought to carry out a survey analyzing a sample of Company X's clients who have or have not adopted technological solutions and their reasons for choosing them. Through this research, it is possible to identify the effects of technology on efficiency, cost reduction, increased productivity and agility in procedures related to payroll management, as well as to assess whether integration between systems has led to improvements in the administration of these processes.

The choice of this specific sector is justified by the need to modernize payroll management procedures and keep up with technological developments. The research sought to migrate from outdated methods to a more contemporary and digital approach, seeing the incorporation of technology as an opportunity to improve efficiency, reduce expenses and optimize procedures. It is important for accounting firms to guarantee a competitive edge, as technology is dominating the job market and the quality of professionals alone may not be enough (Duarte & Lombardo, 2023).

In addition to the first introductory part, this article contains five more sections. The second presents concepts about the origins of accounting and its evolution over the years, linked to the benefits of digital automation in the provision of accounting services. The third section presents the methodological procedures used to carry out this research. The fourth section presents the discussion and analysis and, finally, in the fifth section, we find the final considerations of the study.

2. Theoretical reference

2.1 Digital Revolution in Accounting

It should be emphasized that there is a need to adapt to the evolution of accounting, especially with the Digital Revolution in full swing. Digital technologies have profoundly transformed the way companies operate, interact with customers and manage their information. In this scenario, accounting plays a crucial role in ensuring the integrity, accuracy and usefulness of financial information in the context of the digital revolution (Dantas, 2020).

It is in the context of the digital revolution and the internet that progress and the integration of the previous technologies available have developed in another direction, leading to the so-called Technological Revolution or Fourth Industrial Revolution, which began to

come to the fore at the beginning of the 21st century. The Digital Revolution is a range of technological innovations covering numerous areas: artificial intelligence (AI), robotics, the internet of things, autonomous vehicles, 3D printing, nanotechnology, biotechnology, materials science, energy storage and quantum computing (Schwab, 2018). Thus, in this scenario of service provision, we see the emergence of striking forms of relationship that benefit from the numerous technological tools available (Brasileiro, 2022).

Therefore, given the current reality, it is essential to recognize the importance of technology and incorporate it strategically in order to obtain the best results. Furthermore, those who know how to make intelligent use of the technological resources available will have a great competitive advantage in the market, offering more modern and accessible services. Technologies are not just transforming business management, but practically every aspect of it. They are rewriting the rules surrounding customers, competition, data, innovation and value. Dealing with these changes requires more than a retail or fragmented approach; it requires a complete integrated effort (Staats & Macedo, 2021)

However, despite being a challenge for many companies, starting the digital transformation process is fundamental to adapting to today's consumer model, which increasingly demands communication through apps and digital media. In this context, digital accounting plays a crucial role in the modernization and efficiency of accounting processes. Developing skills to serve clients in the digital environment is essential, even for companies that are already trained in the physical model. When considering digital accounting, it is important to point out that taking the first steps towards digital transformation can be a difficult task due to various factors, such as the need to understand the environment in which the company is inserted and to assess the pace of technological evolution in the market each day, however, it is necessary to overcome these challenges in order to take advantage of the benefits of digital accounting and keep up with the demands of today's market (Gatti, 2020).

The Digital Accounting model follows the line of a disruptive business model. A disruptive business is the union of technology and innovation, which allows products and services to be offered to new markets, whose value proposition seeks products and services with greater simplicity, convenience, accessibility and lower cost (Schiavi, 2019).

Digital accounting is an innovative concept that performs accounting activities in a more automated way. Essentially, it is a business model for providing accounting services over the internet, which seeks to use information technology to simplify the bookkeeping and accounting statement process, providing a more efficient experience for professionals in the field. In general, the digital accounting model involves specific characteristics that depend mainly on the integration of data between the client and the company providing services (Benedetti; Feltrin; Oliveira, 2018).

The resolution of the Federal Accounting Council (CFC), No. 1,078 of August 25, 2006, repeals CFC resolution No. 1,061 of December 9, 2005, which establishes the form of the Brazilian Accounting layout structured in four chapters aligned with the Brazilian Accounting Standards (NBC). In 2015, Digital Accounting gained ground in Brazil, became accepted by several companies in the area and follows the proposal to add value to the customer, as opposed to price competition (Lombardo, 2020).

In addition, digital accounting aims to use information technology to automate bookkeeping and statements. It is a business model aimed at accounting services companies, the principle of which is to replace the manual process of collecting and entering information with an automated management system. This model not only automates clients' financial operations, but also automatically generates all accounting and tax transactions for the accountant. This shared approach brings accountants closer to clients, increasing loyalty and adding value to the service provided, allowing the accountant to have a broader and more strategic view of the client's surveillance situation (Lombardo, 2019).

With the advance of technology, accounting professionals have been forced to look for new ways of operating and demonstrating the importance of their services. They must be aware of their fundamental role in the economic and social scenario and look for innovations to overcome the new challenges and competitions imposed by the market. They must also meet the expectations of consumers who are increasingly demanding and selective in terms of the products and services they offer, due to changes in the aspects related to their activities (Souza; Ascensão; Souza, 2013).

In this sense, digital accounting uses technology to simplify accounting procedures and optimize the productivity and effectiveness of tasks, always aiming to achieve the best results for its clients through a close and collaborative relationship. The digital accounting model gives accountants access to more complete information about their clients, especially through ERP systems integrated with accounting systems, which collect and organize data in a precise and error-free way, ensuring more accurate data analysis and improving strategic planning (Lombardo & Duarte, 2017).

By adopting this practice, daily processes become more automated, with better quality and efficiency. The technological tools used by the company have a decisive impact on how the firm relates to the client and how the client perceives the company in the business market (Lombardo, 2020).

In order for the profile of the business professional in the digital age to be compatible with the demands of the constantly evolving market, it is necessary to consider the growing replacement of people by technology-driven machines. Although this reality is not so far removed from the accounting market, it is essential that professionals adapt to technological innovations in order to optimize work routines without being hindered by automation. Therefore, the digital transformation requires them to redirect their focus of activities within organizations in order to remain relevant and efficient in the digital age. This context highlights the importance of understanding and developing the profile of the accounting professional in the digital age, (Braga & Colares, 2021).

2.2 Profile of the accounting professional in the digital age

The new shape of the economic and social landscape requires accounting professionals to be able to constantly seek out new developments in order to overcome the competition and challenges generated by the market. The ability to evaluate past events, perceive present ones and predict future events is a preponderant factor for business success. In addition, the global trend requires accounting professionals to show that their role is crucial in terms of psychological and social aspects. Despite advances in information technology, the ability to interpret figures and make decisions is still needed by society (Souza, Ascensão & Souza, 2013).

The profile of a modern accountant is that of a highly valued professional who must accumulate a wide range of knowledge in order to operate in a secure job market. They must be technically proficient and creative, with a proactive approach and high integrity. It is important that they have the ability to learn to cope with change and propose ideas for improvement, as well as being flexible and able to innovate and create solutions in their field. To stand out, the professional must also interact with and study political, social and financial realities, guiding companies towards a more promising path amid the turbulence generated by the globalization of the economy. The power to manipulate knowledge is fundamental for major decisions (Silva, Isabela Siqueira, et al., 2021).

The changes that have taken place in the accounting profession due to factors such as globalization, IT innovations, among others, have led these professionals to look for ways to develop their skills and acquire new abilities and knowledge. The profile in this role requires advanced notions in the area of technology, fluency in another language, innovative

language and constant updating. They also need the ability to assist in the decision-making process of entities, practicality, objectivity and caution in the changing accounting scenario (Xavier, Carraro, & Rodrigues, 2020).

Lastly, the profile of the contemporary accounting professional requires knowledge of information systems and coexistence with the technology applied to their field. They must always be up-to-date and constantly learning to meet the demands of the increasingly dynamic and competitive job market.

2.3 Information System - SIC

Accounting has the fundamental characteristic of storing company transactions, requiring a system that is integrated with all its areas. A set of interrelated activities, documents and technologies designed to collect data, process it and report information to a diverse group of internal and external decision-makers in organizations is known as an accounting information system. When well designed, this system can significantly improve decision-making in organizations by meeting various elements of the necessary conceptual framework. Most accounting information systems comprise five parts.

Because it is a system like any other, a CIS can be explained using a general procedural approach with data input, storage, processing and output; it is through it that the general accountant does the accounting and organizes the information on the accounting facts within the organization. The CIS makes it possible to optimize the collection and use of data to support the institution's economic management process (Xavier, Carraro & Rodrigues, 2020).

The design and implementation structure of the CIS makes it a system that consolidates all processes, demonstrating the company's performance and economic and financial results in a structured way. This integrating role can be used as a strategic tool for the company, so that each segment or sector is consolidated in the CIS. The accounting system can be interconnected with information subsystems, especially those relating to external factors, providing extremely accurate information for the company's strategic objectives (Gil, Biancolino & Borges, 2011).

2.4 Accounting information subsystem - Payroll

In general, small and medium-sized companies rely on the services of accounting firms to manage their accounting system, as well as their payroll and tax systems. In this sense, these firms offer services that include bookkeeping, report generation and compliance with accounting, labor and tax obligations. It is common for them to use information systems supplied by companies specializing in the segment, such as Thomson Reuters, SCI Software, JB Software, Sênior Sistemas (Torres, 2020).

As a rule, these information systems encompass various functionalities and have a comprehensive level of configuration, allowing for the inclusion of information demands. In this context, the subsystems that make up the system have specific missions to meet particular needs. However, because they are integral parts, the missions of these subsystems must be in line with the legal information system (Padoveze, 2019).

Among the subsystems we can mention the payroll module, which must modernize and automate processes, given the demand for service in this area. In practice, automation means that the company stops carrying out activities manually and makes technology play an important role in the day-to-day running of the business. As payroll is a somewhat bureaucratic and repetitive task, full of important manoeuvres and direct relations with changes in legislation, it is an excellent field in which to start using technology aimed at optimizing processes, which can generate significant cost savings and greater efficiency, making automation a major plus point (Barbom, 2021).

A complete, intuitive and reliable personnel department system saves time, generates satisfaction and provides benefits for the entire organization. This is possible when the software works in an integrated way with people's work and with other solutions used by the company. Integration with other databases is another factor that influences the operation of the payroll system. In order to calculate salaries, it is necessary to provide the software with data on employees' attendance records and benefit amounts. It is common for systems to easily import information from different time and attendance solutions. However, an advantage of integrated systems is that you can view and process the information in any module. For example, it is possible to adjust a work schedule within the payroll module itself, which helps you to fulfill the workday and process the calculation at the same time (Boff & Silva, 2023).

By using specific software to calculate payroll and process all the organization's data, it is possible to guarantee the accuracy and proper parameterization of information, which facilitates the analysis of indicators. This makes the integrated HR system a valuable tool for the safe and assertive management of operational and strategic processes. It also makes it possible to identify problems, set targets and find effective solutions based on structured, easily accessible information. By using these appropriate solutions, it is possible to reduce the effort involved in carrying out tasks and guarantee effective results by reorganizing activities. Automating processes in organizations is therefore synonymous with optimizing costs, increasing productivity, speeding up processes and boosting results. More than that, it means allowing professionals to focus their energy and talent on the tasks and goals they were actually hired to perform (Boff & Silva, 2023).

What's more, managing people on a large scale requires an analytical approach to human capital figures, without neglecting the importance of people and the individuality of employees. To achieve this, it is necessary to decentralize processes and make the operation more digital. With the help of integrating systems, the sector can focus on strategic issues and make assertive decisions in the corporate environment. In this way, it is possible to use technology to take care of all customer demands (Senior, 2022).

2.5 Integrating Systems - Payroll

ONVIO is the future of accounting solutions from Thomson Reuters. Created from an online platform, the solution manages all the firm's needs, giving accountants and clients the freedom to generate results together, working ever more closely. The tool is available free of charge to the firm's clients and includes client and employee service modules (Reuters, 2023).

The promise of agility combined with technology is great. The client will be able to enter an employee's data for hiring and the firm, upon receiving the information, can carry out the bureaucratic processing and transmit the information to eSocial. Requests for vacations, terminations, monitoring of indicators, entry of payroll information. All this in an agile and practical way. Within the Employee Portal option, employees will be able to receive their payslips, vacations and earnings reports, generating improved productivity for employers, cost savings and optimizing the process of sending documents to employees (Reuters, 2023).

Another major responsibility of an accounting firm is to deliver the tax forms to be paid by its clients on time. As a solution, there is also software adapted to making this delivery quickly and securely. An example of this is NIBO. The software offers management and control of obligations and tasks automatically, in seconds, on time and securely. The software also allows you to keep track of who received and viewed the documents when and operates with recognition robots that detect the documents on your computer and automatically identify the obligations and clients. To top it all off, the system also generates document submission control, showing which forms have not yet been transmitted and, as it is cloud software, it gives the client access from anywhere (Nibo, 2023).

Completing the package of solutions available on the market to speed up and modernize the work of accounting firms is Emissão Simples, which generates a universe of integration between clients. In addition, the cloud-based software offers accounting firms automatic control and sending of installment payment forms, control of tax and federal status reports and certificates, automatic sending to clients and control without the need for manual spreadsheets (Simples, 2023).

2.6 Benefits of Automation - Payroll

Another major responsibility of an accounting firm is the timely delivery of tax forms to be paid by its clients. As a solution, there is also software adapted to make this delivery fast and secure. One example is NIBO. The software allows you to manage and control obligations and tasks automatically, in seconds, on time and securely. The software also allows you to control who has received the documents and when, and works with recognition robots that detect the documents on your computer and automatically identify the obligations and clients. To top it off, the system also generates a document submission control, showing which forms have not yet been transmitted and, as it is cloud-based software, it allows the client to access it from anywhere (Nibo, 2023).

Completing the package of solutions available on the market to speed up and modernize the work of accounting firms is Emissão Simples, which generates a universe of integration between clients. In addition, the cloud-based software offers accounting firms control and automatic sending of installment payment forms, control of tax and federal regularity reports and certificates, automatic sending to clients and control without the need for manual spreadsheets (Simples, 2023). Knowing that most of the activities carried out by accountants have already been done in an automated way, with the help of computers and accounting software, the following operations can be cited within the personnel department that are done in an automated way (Oliveira, 2022).

Although automation brings countless advantages, there are still challenges for accounting office managers when it comes to implementing it. One of the main ones is keeping up to date with new technologies and advances in all related areas. In addition, it is necessary to have the skills to implement automation projects, adapting people and resources to the changes that these projects require (Oliveira, 2022).

2.7 Automation Challenges - Payroll

When automating processes, entrepreneurs can face some challenges. One of them is the lack of attention paid to employee training. Any change in processes, however small, requires learning. When it comes to automating accounting processes, it is essential to invest in training. Employees who are used to performing manual, repetitive and bureaucratic tasks may find it difficult or resistant to change their ways of working. However, many entrepreneurs don't pay enough attention to this crucial stage, which can jeopardize the success of the project. It is a change in behavior that needs to be encouraged in order to generate a new "work culture" (Farias, 2019).

It is important to remember that many employees may feel threatened by automation, for fear of losing their jobs, and it is up to entrepreneurs to establish a clear communication strategy for each employee about their role in the project. With proper training and good communication, employees will realize the benefits that automation brings and adapt easily to the new reality (Farias, 2019).

Another possible challenge is the lack of a good strategy for dealing with customers. Just like employees, many of them may resist change and not want to collaborate with the new tools and procedures. To overcome this barrier, it's important to think of strategies that show

customers the benefits of the new dynamic and, ultimately, dismiss the most reluctant. It's important to remember that the automation and optimization of accounting processes is an inevitable trend for all companies, regardless of size. Although technology is an essential part of automating processes, a team is also fundamental. Machines do nothing without human action. It is therefore essential to ensure that the team is prepared to implement automation successfully (Farias, 2019).

Other challenges include a lack of process mapping, a lack of understanding about the technology, which often leads to uncertainty about the return on investment, difficulty in finding flaws in the processes in order to optimize them and complexity in seeing where to apply automation processes, which prevents the effectiveness of robotization from being assessed. Ultimately, these obstacles are not and should not be prohibitive factors for scaling an accounting firm (Auditto, 2020).

3. Methodology

The chosen research method is a case study, which aims to understand a phenomenon in its real and complex context, exploring a series of variables and factors that can influence the case studied (Nascimento, 2016).

The case study took place in an accounting services company located in the Serra Gaúcha region. The intention of this approach was to involve the adoption of accounting technology solutions, with the aim of optimizing processes and increasing efficiency in the accounting office. The use of technological software can offer various advantages, such as reducing costs, increasing productivity, speeding up procedures and integrating systems.

Descriptive research will be used, which aims to describe and analyze a phenomenon, situation or event in an objective and detailed manner, seeking to understand the reality being investigated (Yin, 2001).

Qualitative research is based on understanding the world in its complexity, adopting an interpretive approach that values the subjectivity of individuals and emphasizes capturing meanings and processes through detailed exploration of the natural environment and the experiences of participants (Pereira, 2019).

A literature review was used to research books, magazines, scientific papers and other published texts related to the area, such as the use of technology and automation in the daily tasks of an accounting office, with a focus on the personnel department sector

Data was collected using a structured questionnaire with open questions, formulated using Google Forms and sent by email and WhatsApp. The questionnaire was analyzed by managers in the area with knowledge and familiarity with the subject. Afterwards, the questions were sent and applied to the accounting firm's clients in order to obtain information about their current use of technology and the reasons behind their resistance to or acceptance of digital solutions.

By using content analysis as a tabulation method to extract meanings, patterns and interpretations from the data collected, the aim is to provide a comprehensive view of how the accounting firm's clients accept and use the technology available.

4. Results and Discussions

4.1 The Company Profile

The study was conducted in an accounting services company located in the Serra Gaúcha region, which has been in the market for more than three decades and has a solid

cliente. The company is registered with Simples Nacional and is categorized as a Small Business (EPP), and will be identified as "Company X".

The main purpose of the research was to examine the implications of using technology to manage the payroll of Company X's clients. The choice of this specific sector is justified by the need to keep up with technological developments and modernize payroll management procedures. The incorporation of technology in this context is seen as an opportunity to improve efficiency, reduce expenses and optimize procedures. In the course of the research, a specific sample of Company X's clients was examined in order to identify the potential effects of adopting technology in payroll management.

4.2 Presentation of Research Results

In order to achieve the survey's objective, a questionnaire was distributed to a representative sample of 35 companies from different segments, with the aim of covering a wide range of realities and perspectives. Obtaining responses from 10 of the interviewees is equivalent to a return rate of 28.57% in relation to the total number of questionnaires sent out.

The responses obtained made it possible to draw up distinct profiles for the three business sectors evaluated and to identify the main challenges they face in terms of adopting and using technology in their routines. The analysis of the results was organized into four distinct sections. The first is aimed at characterizing the research participants. The second deals with the use of automation-related technologies and their impact on payroll preparation by the interviewees. The third focuses on the main benefits and advantages perceived in the use of technology in day-to-day operations. Finally, the fourth and last section focuses on the difficulties faced by the interviewees when incorporating technology into their daily activities.

4.3 Characterization of the research participants

In order to protect the confidentiality of the interviewees, a coding approach was adopted to present the data obtained, which is presented in detail in Table 1.

Table 1 - Coding of interviewees

Coding	Segment	Economic Size	Number of Employees
Company A	Indústria	Small business	Until 20
Company B	Comércio	Small business	Until 20
Company C	Comércio	Large company	Above 41
Company D	Serviços	Microempresa	Until 20
Company E	Serviços	Small business	Until 20
Company F	Serviços	Small business	Until 20
Company G	Serviços	Small business	Until 20
Company H	Serviços	Medium-sized compan	Until 20
Company I	Serviços	Microenterprise	Until 20
Company J	Serviços	Large company	Above 41

Source: Research data (2023).

The predominant segment is services. The characterization by company size highlights a diversity of company sizes.

The predominant perspective in business management is based on the assumption that the size of the company has significant impacts on its efficiency and organizational legitimacy. When organizations face underperformance, it is common for them to respond by implementing strategic and operational changes. These changes can include expanding into new markets, acquiring external resources and reinforcing investments in research and development and innovation capacity (Greve, 2008).

Company E cites as an illustration that it does not use much technology in relation to payroll, as it only has one employee.

Company J, on the other hand, uses all the technological tools made available by the office, because with more than 41 employees and some working externally, technology speeds up the process, adding security and precision to the information. He goes on to say that "the world is changing very fast, it is now seen as essential and an extremely safe way of working, there is no reason or way to get away from it" (interviewee J). Company C adds: "technology is an incredible facilitator, saving time and generating security" (interviewee C).

Several studies have analyzed the relationship between company size and innovation performance. According to some academic perspectives, larger corporations tend to be more innovative, arguing that they have a greater incentive to innovate, especially in contexts of perfect competition. However, there are also economists who maintain that, in ideal competitive scenarios, both large and small companies have distinct advantages and disadvantages in the innovation process (Gomes & Kruglianskas, 2009).

4.4 Automation and its Impact on Payroll

One of the main benefits cited was the significant reduction in the time needed to process payroll, thanks to the implementation of automated systems. Before adopting technology, the process was time-consuming, subject to human error and consumed considerable resources. Automation has allowed companies to save significant time that was previously spent on manual and repetitive tasks. This has resulted in greater productivity and efficiency in operations. Company J. cites how it sees the contribution of technology to the payroll process: [...]

Today we just import a time file into the payroll system, and it processes it and can even alert you to possible inconsistencies. All the information from a collective agreement, for example, if recorded correctly in the system, will not allow any errors (interviewee J).

Participants also pointed out that automation has made it easier to adapt to frequent changes in labor and tax laws. Automated systems can be updated quickly to reflect new regulations, ensuring continuous compliance and avoiding fines and warnings for non-compliance.

Automation is not just limited to payment calculations, but also covers the management of documentation associated with payroll. Digitizing and organizing records electronically has speeded up information retrieval and reduced the physical storage space required.

According to company H, working with digital files is safer because "it reduces physical paper and, in the event of a search, it makes it much quicker to find by date or keyword" (interviewee H). Company I is also a fan of digital storage, because "there's no need to file boxes, everything is more organized, there's no risk of it getting lost, etc." (interviewee I).

Finally, many of the participants mentioned that automation was achieved through substantial financial savings in the long term. Although the initial investment in implementing automated systems can be significant, the benefits in terms of time savings, error reduction and operational efficiency outweigh these costs.

These results show that automation has played a fundamental role in modernizing and optimizing the payroll operations of the companies taking part in the research. The implementation of technology has not only speeded up processes, but has also increased the

quality and accuracy of services, contributing to the satisfaction of the clients served by company X.

4.5 Adoption of Automation Technologies

It was clear that the participants in the survey are at different levels of technology use. Some companies have fully embraced automation, implementing systems that automate processes from clocking in to paying salaries.

These companies have reaped the benefits of the efficiency and precision that automation offers. On the other hand, some organizations are still hesitant to adopt automation technologies due to concerns about data security and the costs associated with implementing and maintaining these systems. Resistance to change is a common challenge when introducing new technologies, which is why these issues must be addressed with strategic change management approaches.

Success in implementing automation is intrinsically linked to a change in organizational culture. Establishing a data culture through the pillars of governance and analysis, as well as change management, allows companies to implement programs with a higher probability of success and, consequently, obtain the desired returns from this impressive technology. It's a long journey that requires preparation, methods, strategy and monitoring. But there is undoubtedly enormous potential for achieving significant results when the data culture era is embraced (Mancini, 2022).

Thus, it can be inferred that the adoption of automation technologies in payroll management is a growing trend, despite the fact that organizations face various challenges throughout this process. Overcoming resistance to change, investing in employee training and keeping systems continually updated are key elements for success in this journey.

4.6 Challenges and Benefits of Automation

Adopting and improving automation in payroll management can present a number of challenges, but it can also offer substantial benefits to companies. One of the most common challenges cited by survey participants is employee resistance to change. The introduction of automated systems can cause apprehension among employees who are used to old processes, generating distrust in the face of transformations.

Even so, the possibilities for understanding can be seen, as mentioned by company H, "changes always have a bit of resistance, but if the benefits are well explained it's only a matter of time and everyone is already familiar with them" (interviewee H). Another factor that can be seen as a challenge is the cost-benefit ratio for the company. Initially, acquiring a program, software or even more space on a server can be a high expense. Naturally, this context needs to be analyzed by a professional who can demonstrate this relationship in figures.

Digital transformation can take on different interpretations in different organizations, but a common feature of these initiatives is the integration of digital technology with the aim of improving business efficiency and agility. These are crucial elements in today's economy, where customers demand competitive prices and instant service. In addition, companies face challenges such as the rising costs of materials, labor, facilities and taxes (Sasse et al., 2022).

Time savings, ease of communication and data transmission between the service taker and the service provider, quality in the delivery of information and savings in paper and physical space are the examples cited as benefits of technology by the participants.

Digitization brings a number of advantages, such as reduced costs and easier access to information, products and services. This is because digitized information is easier to share, update, record and distribute, and can be disseminated quickly via the Internet. This digitalization potential is being harnessed to offer customers more agile and intelligent

services, while at the same time reshaping the business structure of organizations, transforming it into a model driven by digital actions (Sasse et al., 2022).

Although improving automation in payroll management may face initial challenges, the long-term benefits are substantial. Reducing errors, saving time and resources, and the ability to adapt quickly to changing regulations make automation a useful tool for modern organizations. However, it is important to know how to manage resistance to change and carefully manage the transition process to maximize the benefits.

5. Final Consideration

The research refers to payroll automation, and sought to explore the consequences of the considerations identified in current practices and market requirements. It consists of investigating the implications of using technology in payroll management and understanding how organizations are adopting automation technologies in this context.

As a result, it became clear that the use of digital files and technology can no longer be overlooked by companies. According to company H, working with digital files is safer, because "it reduces physical paper, and in the event of a search, it makes it much quicker to search by date or keyword" (interviewee H). Interviewee I mentions that he is a fan of digital storage because "there's no need to file boxes, everything is more organized, there's no risk of it getting lost, etc".

The implementation of payroll automation has resulted in a significant reduction in errors and a notable increase in operational efficiency. Company J outlines the role of technology in the payroll process, citing the following benefits: [...] It is now possible to import a time file into the payroll system, which then processes it and can even alert the user to any inconsistencies. If the relevant information from a collective agreement is correctly recorded in the system, it will not allow any errors to occur (interviewee J).

The results of this survey indicated a general perception that automation represents an opportunity for modernization and competitiveness in the market scenario. Companies of varying sizes—from micro to large corporations—are adopting automation in payroll management, although they face different challenges and opportunities. In this context, it has become clear that employee training and continuous updating of systems play a vital role in the success of automation.

On a scientific level, this research makes contributions to providing important insights into how organizations can manage automation in order to improve efficiency, reduce errors and adapt to ever-changing regulations.

It highlights the need to address the challenges related to resistance to change and initial investment, while also highlighting the substantial benefits that can be gained. The research contributes to both the advancement of academic knowledge and the provision of practical guidance for professionals and organizations seeking to improve their management practices.

A suggestion for future studies is to carry out comparative analyses between different types of company size and payroll systems that adopt technology

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VIOLENCE AGAINST WOMEN: THE ORPHANS OF FEMINICIDE

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Abstract

The article proposes to analyze gender violence in Brazil, the Maria da Penha Law and the orphans of femicide. Objective: To know the advent of the Maria da Penha Law, gender violence and the children of the victim of femicide. Methodology: The study is configured in the literature review, related to the cited theme. The article had as research source the databases in Google Scholar, scientific articles and official documents. The selected language was Portuguese. Discussions: The growth of the phenomenon of gender violence in the contemporary scenario affects the victim's family, especially the children. The Maria da Penha Law emerged when the State recognized the obligation to protect women against any and all types of aggression, the law emerged defining tactics aimed at preventing, punishing and eradicating violence. Result: At the end of the analysis, it can be seen that the roots of violence against women are in the still existing discrimination, which is one of the results of how gender norms and standards are historically formulated and trigger inequalities in relations between men and women, as well as the consequences emotional damage to the victims' relatives are irreparable.

Keywords: Femicide; Maria da Penha Law; Orphan of femicide.

1. Introduction

Domestic violence against women is a cruel form of human rights violation, as it confronts the security proposed in the 1988 Constitution with regard to the right to life, dignity, health and physical integrity (BRASIL, 2012).

Women have suffered various types of violence, especially gender-based violence. As a legacy of patriarchy, women are still culturally seen as the weaker sex, which is why many have suffered silently. This manifests itself in a variety of ways: prejudice; subordination; harassment; psychological, financial and physical abuse, among others.

The increase in femicide has been alarming. The Dicionário On Line De Português (2021) explains that feminicide means "the deliberate killing of women solely because they are women. Hate crime against females, also defined by verbal, physical and psychological aggression".

The concept of gender is linked to the history of the feminist movement, which is the struggle of women against the oppression they suffered (and still suffer) in contemporary society. The history of the feminist struggle was a social movement in the second half of the 19th century in the West, where demonstrations against female discrimination became more

visible and expressive in the so-called "suffragette movement", i.e. the movement to extend the right to vote to women (LOURO, 1997, p. 14-15).

The theory underpinning all the stages of this study on violence against women focuses on gender as a central category of analysis for understanding the dynamics of this phenomenon. The approach focuses on the historical precedence of the construction of this field of study and bibliographical research within the social sciences, particularly sociology.

In this vein, it continues to address the category of violence against women as a major issue in everyday life, due to the volume of reports of the most varied configurations of violence against this gender, which presents itself as a social phenomenon. It sheds light on the children of victims of femicide and, finally, highlights the legal milestone of advances in rights in the Maria da Penha Law, No. 11.340, of August 7, 2006 (BRASIL, 2006).

In Brazil, the Feminicide Law was passed in 2015. This is Law No. 13.104/15, which amends the Brazilian Penal Code by instituting a new specific aggravating factor for homicide: feminicide, which is basically homicide committed against a woman as a result of gender discrimination, i.e. because of her social status as a woman, and can also be motivated by or concomitant with domestic violence. (BRASIL, 2015).

The main aim of this study is to learn more about gender violence, the advent of the Maria da Penha Law and the orphans of femicide. The preference for this subject was motivated by an interest in delving deeper into the issue, which has become increasingly evident due to the growth in the number of cases today. As elucidated by the Brazilian Public Security Forum, "the numbers of femicides and female homicides are on the rise, indicating that domestic and family violence is on the rise". (BRASIL, 2020, p.15). In the study, the Forum makes a comparison with previous years and points out that "in São Paulo, the increase in femicides reached 46% in the comparison between March 2020 and March 2019, and doubled in the first half of April". (BRASIL, 2020, p.15).

With regard to families who have been victims of violence, their daily lives are a repeated attempt to regain a balance in social life and health, where they have tragically been the targets of a breakdown in biological, emotional and social conditions. This turns the family into victims, living with losses and memories. Violence turns a healthy and balanced individual into a "victim", a hostage to violence

2. Methodology

In order to achieve what it sets out to do, the study in question carried out a bibliographical and qualitative survey. The methodological approach is based on the following authors.

The data collection technique used was bibliographic, which, according to Gil (2008), is based on material that has already been prepared, consisting mainly of books and scientific articles.

According to Pizzani (2012, p.54)

Bibliographical research is understood as a review of the literature on the main theories that guide scientific work. This review is what we call a bibliographic survey or literature review, which can be carried out in books, periodicals, newspaper articles, websites and other sources.

The qualitative approach, according to Minayo (2007), considers the dynamic relationship between reality and the subject, between the objective and subjective worlds. In this type of approach, the possibility of getting answers at a particular level is much more

solid. The qualitative approach looks at a reality where quantification should not take place, or more precisely is based on meanings and motives, as well as aspirations, beliefs, values and attitudes (MINAYO, 2007).

In order to carry out scientific research, the appropriate classification of methodology standards teaches the best methods practiced in a given field in order to produce knowledge. Therefore, all the stages outlined here are important guidelines for achieving the objectives of this research.

The study in question carried out a bibliographical survey of articles, books, scientific journals and official manuals published on the subject of gender violence, the Maria da Penha Law and the orphans of femicide

For a better understanding of the subject, the study was made up of three categories, In other words: Violence against women in Brazil, the Maria da Penha law and the breakdown of families and the orphans of femicide.

3. Results and Discussion

3.1 Violence against women in Brazil

Violence has always been a complex and controversial reality in history. Philosophy, science and politics have tried to explain this phenomenon, which accompanies and integrates our interpersonal lives, our institutions and proposals for change. According to Arendt, "no one who devotes himself to meditating on history and politics can remain ignorant of the enormous role that violence has always played in human activities." (ARENDT, 1970, pag. 7).

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Throughout history, women have extrapolated the roles they occupy socially, threatening patriarchal power, and through these changes it has become common for situations of physical and/or psychological violence to arise (VELLOSO, 2013, p.23). The understanding turns to gender itself, which turns out to be a straitjacket: domination is the man's and therefore he must aggress, to impose himself in any way; for the woman, all that remains is to endure the aggression in any way possible, and the understanding is that it was her choice and it is her "destiny." (VELLOSO, 2013, p.27 quoting SAFFIOTI, 1999).

Pointed out as the main agent of violence against women, patriarchy, an ancestral system, promotes inequalities, abuse and discrimination due to the roles assigned to men and women in society.

Velloso (2013, p.19) quotes Bourdieu (1995):

male domination is sufficiently assured that it needs no justification, i.e. it is a social structuring of ownership, power and control over bodies, over the sexuality and sexual conduct of non-male genders, over public territories in the labor market and in decision-making, management and political positions (Velloso, 2013, p.19)

Women have always occupied an inferior position in society, their role was to procreate, feed, wash, socialize, care for and protect the family, in other words, their duties were limited to the private sphere of the home, looking after the children and the husband. Outside work was denied.

Violence against women constitutes a violation of human rights and fundamental freedoms, limiting all or part of the observance, enjoyment and exercise of such rights and freedoms, resulting in Decree No. 1,973 of August 1, 1996 (PASINATO, 2016).

The World Health Organization (WHO) has recognized violence against women as a public health problem, decreeing the need to effectively combat and prevent the phenomenon (PAIVA et al., 2014). Violence against women is considered a violation of human rights and also a collective health problem, as it affects women's health and quality of life, including damaging their social life, making them psychologically upset (SILVA et al., 2015).

In addition, the countless cases of violence against women, which have been growing annually, are of various forms, and the one that stands out the most in the care provided to women through the Unified Health System (SUS) are: physical violence in 48.7% of care, followed by psychological violence with 23% of cases, and sexual violence with 11% of care provided by the SUS (WAISELFISZ, 2015).

According to Garcia, the most common instruments used to commit violence are firearms in 50% of cases, followed by sharp objects in 33%, and hanging in around 5.9% of cases. However, deaths due to mistreatment were less frequent, accounting for 2.7% of homicides (GARCIA et al., 2015).

Silva; Ávila; Moura (2022, p.5) states that "In 2021, Brazil recorded one rape every 10 minutes and one femicide every 7 hours, according to a survey by the Brazilian Public Security Forum, published on March 7, 2022, the eve of International Women's Day."

Jung; Campos (2019, p.80) state that:

Brazil has high rates of violence against women. The high incidence of gender-based murders of women in the country at the start of 2019 prompted a statement from the Inter-American Commission on Human Rights (IACHR), published on February 4, warning of the problem. During the period, at least 126 women were killed for gender reasons in the country, in addition to 67 attempted murders.

Arruda (2021, p 42) states that according to the definitions in the Maria da Penha Law (Law 11.340/2006) "domestic violence is any action or omission based on gender that causes a woman death, injury, physical, sexual or psychological suffering and moral or property damage"; occurring "within the domestic unit (...), within the family" (...). Arruda (2021, p 42) also points out that violence against women occurs "in any intimate relationship of affection, in which the aggressor lives or has lived with the victim, regardless of cohabitation".

The author Day (2003, p. 15) explains in her studies that the aggressors are members of the women's own family or their intimate partners. Between 40 and 70% of female homicides in the world are committed by intimate partners (DAY, 2003, p.15).

3.2 The Maria da Penha Law

According to Soares (2004, p. 162), feminism "encompasses theory, ethical practice and takes women as the historical subjects of the transformation of their own social condition. It proposes that women set out to transform themselves and the world". Cisne (2015) gives an overview of what the feminist movement has meant in the history of women's struggles. Cisne (2015) goes on to say that feminism is divided into three so-called feminist currents: radical feminism, socialist feminism and liberal feminism. Thus, radical feminism was centered on equality between men and women in all spaces; while socialist feminism was based on the perception that women should occupy positions in politics in order to have equality in the correlation between genders; finally, liberal feminism aims to show that women are capable of exposing their potential through their attitudes and actions, fighting for equality and conquering spaces in the public and private spheres. (CISNE, 2015).

Historically, when women went beyond the social roles determined for them, patriarchal power was directly or indirectly challenged or threatened. Consequently, situations of physical or psychological violence against women arose (VELLOSO, 2013).

The field of gender studies was consolidated in Brazil at the end of the 1970s, when feminist movements were growing stronger in the country. This was due to resistance to the truths established in the production and reproduction of social relations between men and women, i.e. the intention to disassociate women from the role of motherhood, beauty, delicacy, etc. (HIRATA, 2001).

As a result of concern about the reality experienced by women around the world, according to Jung; Campos (2019, p.80) quoting Pimentel (2010), international organizations were created. They are: the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW), adopted by the United Nations General Assembly on December 18, 1979, which entered into force on September 3, 1981; the Plan of Action of the Fourth World Conference on Women (1995); the Inter-American Convention on the Prevention, Punishment and Eradication of Violence against Women (Convention of Belém do Pará, 1994); the Optional Protocol to the Convention on the Elimination of All Forms of Discrimination against Women, as well as other human rights instruments. (JUNG; CAMPOS, 2019, p.82)

Therefore, linked to these significant bodies, there was intense public commotion with the denunciation of the case of pharmacist Maria da Penha Fernandes, who according to Velloso (2013, p.13) after suffering attempted murder committed by her husband, who in addition to going unpunished, was about to get the statute of limitations on the crime, this case, admittedly a failure of the State, led to the emergence of the aforementioned law with the denunciation made by human rights organizations to the Inter-American Commission on Human Rights, which is an organ of the Organization of American States (OAS). The complaint also led to the trial of the perpetrator.

Domestic violence in Brazil became internationally recognized with the enactment of this law and as a result of the case of the 38-year-old pharmacist, born in Ceará and mother of three girls, who in May 1983 was the victim of an attempted murder by her husband, university professor Marco Antônio Heredia Viveiros. While Maria da Penha was sleeping, she was shot, leaving her paraplegic (ARAUJO; TEIXEIRA, 2017).

With regard to the Maria da Penha Law, the authors Piovesan and Pimentel (2007, p. 01) state that "by confronting the violence that disproportionately affects so many women, it is an instrument for achieving material equality between men and women, giving effect to the constitutional will, inspired by compensatory ethical principles". This law is recognized as a

legal milestone for the protection of women, because it was through this law that some paradigms were broken in a long historical process of violence against women. The publicizing of women's rights has produced positive results, which have led to a new division of social roles between men and women, with equal rights. In other words, the dignity of the human person, with all its intensity conferred on men, is now being added to women.

Regarding the Maria da Penha Law, Jung; Campos (2019, p.83) state that:

The law establishes the following forms of domestic and family violence, among others (art. 7): physical violence, psychological violence, sexual violence, property violence and moral violence. Also according to the law, against domestic and family violence, emergency protective measures can be ordered, which can be granted by the judge, based on a request from the Public Prosecutor's Office or at the victim's request. They can be granted immediately, regardless of a hearing between the parties or a statement from the Public Prosecutor's Office, which must be notified promptly (arts. 18 to 23).

Considering the failure of aggressors to comply with emergency protection measures, we also found some changes to the Maria da Penha Law to fill in gaps. The modification made according to Jung and Campos:

Recently, two new laws - 13.505/17 and 13.641/18 - made changes to the Maria da Penha Law. The first came with the aim of strengthening protection for women victims of domestic and family violence, with specialized police and expert assistance and guidelines and precautions to be adopted when interviewing victims and witnesses. The second criminalized non-compliance with emergency protective measures. This most recent change was proposed in view of court decisions that concluded that it was not possible to arrest the person who failed to comply with the protective measure, since the conduct was not criminalized. The penalty for non-compliance is 3 (three) months to 2 (two) years in prison (JUNG; CAMPOS, 2019, p.84).

And according to Jung and Campos (2019, p. 85) "It should be noted that there is an underreporting of cases of domestic violence, since not all victims manage to break the barrier of silence and report their aggressors". With regard to the penalty for those who commit femicide, it is important to note that as it is a qualified form of homicide, the penalty is higher than for simple homicides.

3.3 The Breakdown of Families and the orphans of femicide

According to Day (2003, p.15) "violence against women is the most widespread type of human rights abuse in the world and the least recognized". With regard to gender violence, according to the studies by Silva; Ávila; Moura (2022, p.1) "femicide, as a crime considered heinous, tragically interrupts the lives of countless mothers, transforming their children into orphans of femicide, linked to a psychological trauma that will accompany them for the rest of their lives with serious social consequences".

The emotional upheaval sometimes translates into physical suffering, the feeling of a wounded body. However, not only do somatizations reflect feelings, suffering introduces changes, temporary or even permanent, in family dynamics and in the relationships established between its members.

Silva; Ávila; Moura (2022, p.1) citing Barufaldi La (2017) allude that:

Femicide is the pinnacle of violence against women, but the morbidity related to this practice often leaves harmful consequences not only for the woman, but for her entire family, especially her children. Gastrointestinal problems, sexually transmitted infections, sexual dysfunctions, fibromyalgia, depression, panic disorder are some examples, as well as deep psychological trauma (BARUFALDI LA, 2017).

Conflicts generated by violence within the family environment are frequent. The absence of a murdered loved one is a permanent reminder of established and fragile relationships. The family goes from being a source of pleasure to a source of discomfort and anguish.

For Silva; Ávila; Moura (2022, p.5) quoting Cerqueira (2015):

Although femicide exists in Brazilian legislation, this category is not included in the death certificates produced by the health system, since legal classification is the responsibility of the institutions of the criminal justice system. This is because international literature recognizes that most homicides committed inside the home are committed by people known to the victim

For the mothers of victims of femicide, the pain of losing a daughter is experienced in a very particular way, where the constant feeling of loneliness for them is one that neither society nor the family can understand. Social relationships lose their meaning and there is no longer any pleasure in making connections, weakening their relationships.

For the children, the problems add up, because in addition to the loss of their mother, there is also the loss of their father. In this sense, Silva; Ávila; Moura (2022, p.7):

The constant increase in cases of femicide creates a parallel drama with serious psychological consequences: that of children and adolescents who have lost their mothers to violence and, in many cases, their fathers to prison. Children and adolescents exposed to extreme violence end up motherless and, in most cases, lose their fathers too. It is common for the perpetrators of the crime, almost always the victims' partners or ex-partners, to be imprisoned or to commit suicide. Silva; Ávila; Moura (2022, p.7).

When the family learns of the loss of their loved one, they suffer an intense emotional shock, and then a long process of mourning begins, where there is the beginning of a change in attitude towards their lives and experiences. Silva; Ávila; Moura (2022, p.8) mention that "children who witness the countless acts of violence practiced against their mothers, which culminate in the crime of femicide, develop countless traumas in a short space of time". According to Ávila; Moura (2022, p.8) quoting Diniz (2020), "it is essential to welcome them so that these shocking images of violence do not lead them into a state of anxiety and cause them to develop symptoms of chronic anxiety, depression or schizophrenia". Ávila; Moura (2022, p.8), quoting Fontebom (2016), state that:

it is common for children who have experienced femicide, or who have not even witnessed the crime, to present the most diverse and painful situations, such as depression, irritability and aggression, repetitive and distressing thoughts, thoughts of death, difficulties in relationships, compulsion for food, drink or drugs, feelings of being persecuted, anxiety, depression, outbursts of anger, mood swings, difficulties in staying in jobs, developing various types of illness, panic

disorder, risk of cognitive impairment, such as learning disorders and loss of interest in studies, among countless other problems. Ávila; Moura (2022, p.8), quoting Fontebom (2016)

In this context, as Jung and Campos (2019, p.85) explain, "Violence has repercussions on the social life of all citizens and the orphans of femicide can naturalize violence and reproduce it in the future."

The authors Jung and Campos (2019, p.88) also point out that:

the process of violence that culminates in the murder of a woman on gender grounds has left thousands of orphans in Brazil. These are children and adolescents who are deprived of their mother's care by their father or stepfather, and who are raised by relatives or institutions.

It is important to note that a large number of women, young people and girls are subjected to some form of violence on a daily basis in Brazil and around the world.

4. Final Considerations

The aim of this bibliometric article on the application of the multi-door model in the judicial system was to analyze academic studies and research related to the topic. Through the literature review, it was possible to identify a growing interest in implementing alternative conflict resolution mechanisms in the legal sphere, with the aim of relieving the judicial system and providing a more efficient and satisfactory resolution for the parties involved. It is clear that the subject is of great interest and repercussion for society, which seeks to have its conflicts resolved quickly and fairly, thus complying with constitutional precepts.

The results highlight the importance of the multi-door model as a viable alternative for resolving disputes, offering the parties involved a range of options that go beyond the traditional judicial route. Among the main benefits pointed out are speed, confidentiality, savings in resources and the possibility of preserving relationships between the parties.

However, despite the progress made and the growing adoption of the multi-door model, there are still challenges to be faced, such as the lack of knowledge and awareness of the existing alternatives, as well as cultural and institutional resistance to its implementation.

In light of the above, we can conclude that the multi-door model is an important tool for modernizing and improving the judicial system, contributing to greater efficiency and effectiveness in resolving conflicts. However, a joint effort by the various players involved is needed if these alternatives are to be widely adopted and their benefits fully exploited.

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MANAGEMENT COMPETENCIES AND THE ROLE OF THE ADMINISTRATOR

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Abstract

The general objective of this study is to identify which management competencies are most important/necessary for administrators to work in their profession. The specific objectives are defined as identifying important/necessary management skills for acting as a manager and analyzing/cross-referencing the skills developed in the administration course (according to the pedagogical project) and the skills considered important/necessary for acting as a manager, by the graduates in Administration. It uses a quantitative, descriptive methodology and a survey strategy. Data collection for this method is structured using a formal questionnaire. The participants were around 650 business graduates. The methodological procedures used to analyze the data include statistical tools, using spreadsheets and tables generated in the Excel program. The results obtained relate to the most important/necessary management skills for working as a manager, which are people training, leadership and motivation of teams and people. These are strategic management, conflict management, people management and adapting to change. The competences strategic management and conflict management are not explicitly included in the administration course's pedagogical project.

Keywords: Administration course; Graduates; Competences.

1. Introduction

The theme of this study is "management skills and the role of the administrator". According to Cassol et al (2017), faced with the current scenario in which competitiveness is fierce, forcing companies to present themselves efficiently and effectively in order to overcome market challenges, managers need to be ready to respond to various situations and know how to deal with the new needs imposed by the market. To do this, they need to possess or develop certain individual skills, which can be improved and trained over time

Fleury (2000) says that professionals need to have skills that make them commit to fulfilling the objectives imposed on them, performing their duties, tasks and responsibilities effectively. Only in this way will organizations be able to overcome the obstacles imposed by the business environment.

Given this context, it is necessary to rethink, analyze and define the competencies of the professionals in the job market and which of them the administrator needs to seek in order to continue to be part of the differentiated market that is becoming increasingly dynamic and fierce.

The aim of this study was therefore to identify which management skills are most important/necessary for administrators in their profession.

2. Theoretical framework

2.1 Competencies

The term competencies is conceptualized in different ways. According to Zarifian (2008), competence alludes to the metacognition and attitudes related to work, based on the premise that, in a dynamic and competitive environment, it is not possible to consider the work as a set of predefined and static tasks or activities. For this author, competence means taking responsibility for complex work situations, allied to the systematic exercise of a reflexivity at work, allowing the professional to deal with unprecedented, surprising events of a unique nature.

Still, for Zarifian (2008), competence is the placement of resources in a practical situation. From the acquired knowledge, the individual transforms it as the diversity of situations increases. Competence is initiative under the condition of autonomy, which supposes the mobilization of two types of resources, the internal personal resources (acquired, requested and developed by individuals in a given situation), and the collective resources (brought and made available by organizations).

For the author, it is the ability to mobilize networks of actors around the same situations, to share challenges, to assume areas of responsibility. There are some key words that Zarifian (2008) considers for the definition of competence, which are: initiative, responsibility, practical intelligence, acquired knowledge, transformation, diversity, mobilization of actors, and sharing. They concern the individual and the work process.

The notion of competence can be related to verbs such as: knowing how to act; mobilizing resources; integrating multiple and complex knowledge; knowing how to learn, engage; take responsibility; have a strategic vision. Furthermore, competencies must add economic value for the organization and social value for the individual (Fleury & Fleury, 2011).

McClelland; Boyatzis (1982) defined individual competencies for work as the specific characteristics of a person, which directs him to a superior performance in his activities. The focus is on the capacity and ability that an individual possesses to perform a certain task, or to make a statement about a certain subject. Thus, competencies are understood as inputs to processes, that is, a set of pre-existing knowledge, skills and attitudes (CHA), linked to the professional's position and which will determine individual performance.

Still, individual competencies are synergistic combinations of knowledge, skills and attitudes, expressed by professional performance within a given organizational context, and that add value to people and organizations (Turner, 2022).

It is understood, therefore, that knowledge is everything that can be formally learned; it is the specific techniques of each position; it is the knowledge that is linked to responsibilities/processes; it can be developed from training/experience. Knowledge implies questioning and efforts focused on information that can add value to the work. Knowledge is what one must know to develop with quality that which is assigned to him (Ruas, 2005).

Skill is a set of knowledge that can be formally learned. However, although it can be learned, it requires personal aptitude. Skills refer to know-how. It focuses on the development

of practice and awareness of the action taken. Skills are what one must know in order to perform well (Ruas, 2005).

The attitude is a posture, a behavior that the professional needs to exercise the position. Attitudes refer to knowing how to act. It is the search for a behavior more consistent with the desired reality. At this moment, the union between speech and action takes place. One must know how to act in order to adequately use knowledge and skills (Ruas, 2005).

Therefore, knowledge, skills, and attitudes are interdependent to the extent that in order to exhibit a skill, the individual is presumed to know specific principles and techniques. The adoption of a behavior at work requires a person to hold not only knowledge, but also appropriate skills and attitudes. Based on the above, the competencies required for an administrator will be presented, according to the pedagogical project.

2.2 Competencies developed according to the Pedagogical Project of the Administration Course

The ethical principles concern the person, the commitment of the professional in administration to the environment, sustainability, and individual and cultural plurality and diversity. They are described below, according to the Pedagogical Project of the Administration Course (2018):

- a) Respect for the person: the person is valued and respected as an individual and citizen, in the organizations where the professional acts;
- b) Commitment to the environment: the Administration course must promote and participate in actions that contribute to sustainable development, with the main objective of preserving life. It presents an articulated approach to local, regional, national and global environmental issues;
- c) Sustainability: the Administration course must seek, for the organizations, economic, social and environmental sustainability, through an efficient and effective management of human, technological and financial resources;
- d) Plurality and individual and cultural diversity: we pursue the recognition and respect for plurality and individual and cultural diversity.

Also, according to the Pedagogical Project of the Administration Course (2018), the epistemological principles are open in inter, multi and transdisciplinarity and local and global insertion:

- a) Inter, multi and transdisciplinarity: the Administration Course assumes the basic principles of pluralism of ideas and pedagogical conceptions, from the perspective of inter, multi and transdisciplinarity;
- b) Local and global insertion: simultaneous insertion at the local, regional, national and international levels is sought. Thus, the Administration course at UCS is committed to developing and strengthening interaction between governments, industry and university to create innovations that contribute to economic development, competitiveness, social welfare and regional development.

The pedagogical principles address teaching qualification, knowledge in a process of construction, deconstruction and reconstruction, learning, methodology, articulation with research and extension, innovation and entrepreneurship, and continuous improvement of organizations (Pedagogical Project of the Administration Course, 2018):

- a) Faculty qualification: The teacher works as a team and with cooperation and is in continuous training;
- b) Knowledge in a process of construction, deconstruction and reconstruction: Knowledge is in a constant process of construction, deconstruction and reconstruction, being transformed by the individual's action on his world;
- c) Learning: the conception of learning is based on an interactionist assumption, in which knowledge is built through the dialog that the individual maintains with others, with culture, and with the organizational context;
- d) Methodology: Priority is given to activities that provide students with the opportunity for reflective and effective learning. In addition to the in-class activities, there is the Effective Student Work (EWT) in which activities are planned that the student, as an agent of his learning process, will carry out out of class. The Effective Student Work (TDE) consists of out-of-class academic activities developed by the students at times other than those intended for classroom activities, planned by the professor;
- e) Articulation with research and extension: Besides TDE, students can complement their education through research activities (scientific initiation scholarships) and extension activities (courses, lectures, projects in the university community and in the area of Social Sciences). The performance of such activities allows for the deepening of knowledge, the development of a systemic vision, the improvement of interpersonal relationships, contributing to the formation of professional competencies and skills;
- f) Innovation and entrepreneurship: the search for entrepreneurship, scientific, technological, and cultural innovation must guide the actions of the Administration course;
- g) Continuous improvement of the organizations: the objective is the continuous improvement and modernization of organizational processes.

Finally, the PPCA (2018) addresses the legal principles, where the course must meet the Law of Directives and Bases of National Education - LDB - Law No. 9.394, of December 20, 1996; National Curriculum Guidelines (DCN); National Education Plan (2014); Law No. 12. 881, of November 12, 2013 - Definition, qualification, prerogatives and purposes of community institutions of higher education; Institutional Development Plan (2017-2021) - University of Caxias do Sul; Pedagogical-Institutional Project (PPI) - University of Caxias do Sul.

In continuity, the course objectives are highlighted, where the main one is to train competent professionals to, in the sphere of organizations, exercise management functions, triggering actions that are focused on the development of the organizations themselves, promoting, the social and economic well-being of the communities in which they are inserted. (PPCA, 2018).

- a) Regarding the specific objectives, it is emphasized;
- b) To enable the development of a critical consciousness that guides the analysis of innovative strategies suitable for companies and the demands of local and global markets;
- c) Assist the future professional in his insertion in the process of socioeconomic, political and cultural development of the society in which the organizations are inserted;
- d) Create conditions for the students to develop technical and behavioral competencies for the management of organizations;
- e) To foster the understanding of issues related to the environment;

- f) To enable the improvement of attitudes and practices that take into account social responsibility, ethics and respect for diversity on the part of organizations;
- g) To encourage the academics for the entrepreneurship issue.

Finally, for this study, the following are the competencies required of the graduate in Administration, according to the PPCA (2018). It is important to emphasize that the Ministry of Education and Culture (MEC) established, in the Curricular Guidelines for Undergraduate Courses in Administration, specific competencies and skills for the training of the professional. Thus, the PPCA (2018), highlights the profile of the egress and the necessary competencies, exactly based on such Curricular Guidelines:

- a) recognize and define problems and opportunities, equate solutions, propose actions aligned to strategies, introduce modifications in the productive process, act preventively;
- b) develop expression and communication skills compatible with professional practice, including negotiation processes and interpersonal or intergroup communication;
- c) reflect and act critically about the production sphere, understanding their position and function in the productive structure under their control and management;
- d) develop logical, critical and analytical reasoning to operate with values and mathematical formulations present in formal and causal relationships between productive, administrative and control phenomena, expressing themselves critically and creatively in the face of different organizational and social contexts;
- e) have initiative, creativity, determination, political and administrative will, willingness to learn, openness to change, and awareness of the quality and ethical implications of their professional practice;
- f) develop the ability to transfer knowledge from everyday life and experience to the work environment and their professional field of action, in different organizational models, proving to be an adaptable professional;
- g) coordinate and integrate the different functional areas of organizations, identifying and allocating resources, people and functions;
- h) develop human capital, through leadership and teamwork within organizations, monitoring results and evaluating performance;
- i) manage, through a dynamic posture, change and risk situations that affect organizations;
- j) develop entrepreneurial capacity to elaborate, implement and consolidate projects in organizations;
- l) develop capacity to carry out consultancy in management and administration, administrative, managerial, organizational, strategic and operational opinions and expertise.

The competencies present in the pedagogical project of the administration course were addressed, and in the sequence, competencies required by the labor market for the administrator are presented.

2.3 Skills required by the job market for Administrators

The competencies required by the job market are presented below, as an important tool for the development of professionals and the companies where they work.

Barnard (1979) was one of the first scholars to outline some competencies aimed at managers. He stated that the performance of organizations is influenced by changes coming

from the external environment and, due to these interventions, the executive must develop three major competencies: communication, promote the assurance of essential efforts, and formulate and define purpose for the organizations.

Mintzberg (1983) identified some managerial skills as important for his functions. These are: relationships with colleagues, leadership, conflict management, information processing, decision making under conditions of ambiguity, resource allocation, and entrepreneurship.

Katz (1986) classifies competencies into three categories: technical, human and managerial. The technical ones are related to the execution of the work and to the mastery of the specific knowledge required to perform the operational work. The human competencies consist of the ability and facility to work with and lead people, to communicate, to understand their attitudes and motivations. And the managerial ones are about considering the company as a whole. They include the recognition that the various functions in an organization depend on each other.

Pinto and Lemos (2006) analyzed the type of manager required by large private companies. The results highlighted that behavioral competencies are more important than technical competencies.

In 2015, the Federal Council of Administration, together with the Regional Councils, carried out a wide-ranging survey, the results of which revealed, among other things, the profile, training, work and job opportunities of administrators.

As a result, the Identity of the Administrator was delineated, where, in the view of Entrepreneurs/Employers, Administrators have specific knowledge, skills, abilities and attitudes that allow them to form, lead and motivate work teams, articulate the various areas of companies, and have a holistic vision.

The results of the National CFA/CRA's System Survey (2015) indicated the following identity for the Administrator:

- a) Trainer, leader and motivator of teams;
- b) Articulator and coordinator of the organization's areas;
- c) Professional who acts with a systemic/holistic view of the organization;
- d) Optimizer of the use of resources;
- e) Professional with a focus on results.

The 2015 survey looked at the knowledge, competencies, skills and attitudes of administrators during their undergraduate studies (PESQUISA NACIONAL SISTEMA CFA/CRA's, 2015).

The specific knowledge surveyed is: (PESQUISA NACIONAL SISTEMA CFA/CRA's, 2015):

- a) People management;
- b) Finance and budget;
- c) Strategic management;
- d) Sales and marketing management;
- e) Systemic management.

Thus, the most important competencies are:

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- a) Identifying problems, formulating and implementing solutions;
- b) Develop logical, critical and analytical thinking about the business environment;
- c) Taking charge of the decision-making process in planning, organizing, directing and controlling actions;
- d) Manage conflicts;
- e) Prepare and interpret scenarios.

In this way, the research highlights the following as necessary skills for the performance of the profession of Administrator:

- a) Ability to relate;
- b) Vision of the whole;
- c) Leadership;
- d) Adaptation to change;
- e) Creativity and innovation.

The most important attitudes that appeared in the 2015 survey results relate to:

- a) Ethics;
- b) Commitment;
- c) Professionalism;
- d) Continuous learning;
- e) Proactivity;
- f) Motivation.

Finally, the competencies that form part of the manager's identity, their knowledge, skills and attitudes, were described and presented. Below is the method used for this study.

The most important attitudes that appeared in the 2015 survey results concern:

- a) Ethics;
- b) Commitment;
- c) Professionalism;
- d) Continuous learning;
- e) Proactivity;
- f) Motivation.

Finally, the competencies that form part of the manager's identity, their knowledge, skills and attitudes, were described and presented

3. Methodology

This article was developed from the quantitative research method with descriptive character (Creswell, 2007); Marconi; Lakatos, 2008), Roesch, 2009).

The population of this study was defined as all graduates of the Administration course at the Nova Prata Campus - Universidade de Caxias do Sul, graduated between the year 1998

(first graduation of the course), and the year 2018 (last graduation to date), making up around 650 students.

After determining the research participants, it is necessary to identify a representative sample of this group. This sample must be significant and consider a margin of error. Thus, we used the sample size recommended by Hair et al. (2009), which is 3 to 10 respondents per question on the questionnaire. The questionnaire was composed of 33 closed and 1 open questions, totaling 34. With an initial parameter of 3 respondents per questionnaire question, a return of at least 102 answered questionnaires is acceptable. A total of 107 valid questionnaires were returned.

The choice of egresses was made through probabilistic sampling, since the probability of including each employee from the population in the sample is known and equivalent, since the egresses are selected based on the relation of egresses from the Administration course - Nova Prata Campus (CHURCHILL, 1999; MALHOTRA, 2004).

Therefore, it can be said that the probabilistic sampling was designated in a simple random way for the selection of the egresses who were the research units.

Initially, a pre-test was applied to a pilot sample, with the objective of knowing if the questions were well formulated and refining the form. It was applied to three graduates, who did not participate in the final research, and the initial questionnaire did not present any changes.

Data collection involved the following procedures: sending the questionnaire via e-mail, whatsapp, and google forms. The questionnaire was available to the graduates in the period April and May 2019.

The methodological procedures employed for data analysis involved statistical tools, using spreadsheets and tables generated in the excel program

4. Presentation and analysis of results

4.1 Identifying, in the view of the Nova Prata Campus Administration graduates, the important/necessary management skills for working as a manager.

The competencies were analyzed according to: the administrator's identity, specific knowledge, skills, abilities and attitudes (Pesquisa Nacional Sistema CFA/CRA's, 2015). It also describes the management competencies, the number of responses for each one and the % of total respondents, in descending order, i.e. from the competency with the highest score to the one with the lowest score. For the score obtained in the competencies, a cut-off percentage was defined as follows:

- a) Score above 70%;
- b) Score between 60 and 69%;
- c) Score between 50 and 59%;
- d) Score between 40 and 49%;
- e) Score between 30 and 39%;
- f) A score between 20 and 29%;
- g) A score between 10 and 19%.

The important/necessary management skills for working as a manager, in the opinion of management graduates, are shown in Table 1.

Table 1 - Important/necessary management skills for working as a manager, in the view of Management graduates

Scope of competencies (Pesquisa Nacional Sistema CFA/CRA's, 2015)	Management competencies (PESQUISA NACIONAL SISTEMA CFA/CRA's, 2015)	Responses of graduates	% responses of graduates
1. Administrator's identity	1.1 Training people	79	73.83
1. Administrator's identity	1.2 Leadership	77	71.96
1. Identidade do Administrador	1.3 Motivating teams and people	75	70.09
2. Specific knowledge	2.3 Strategic management	73	68.22
3. Competencies	3.9 Conflict management	71	66.36
2. Specific knowledge	2.1 People management	70	65.42
4. Skills	4.4 Adapting to change	70	65.42
4. Skills	4.2 Vision of the whole	59	55.14
3. Competencies	3.1 Identifying problems, formulating and implementing solutions	58	54.21
4. Skills	4.6 Innovation	56	52.34
5. Attitudes	5.3 Professionalism	56	52.34
5. Attitudes	5.5 Proactivity	56	52.34
5. Attitudes	5.1 Ethics	55	51.40
1. Administrator identity	1.6 Systemic/holistic view of the organization	53	49.53
1. Administrator identity	1.8 Focus on results	53	49.53
5. Attitudes	5.2 Commitment	53	49.53
2. Specific knowledge	2.2 Finance and budget management	52	48.60
4. Skills	4.1 Ability to relate	52	48.60
4. Skills	4.5 Creativity	52	48.60
5. Attitudes	5.4 Continuous learning	39	36.45
2. Specific knowledge	2.4 Sales and marketing management	38	35.51
1. Administrator identity	1.7 Optimizing the use of resources	37	34.58
3. Competencies	3.2 Logical thinking about the business environment	37	34.58
3. Competencies	3.10 Developing and interpreting scenarios	35	32.71
3. Competencies	3.3 Critical thinking about the business environment	34	31.78
3. Competencies	3.5 Decision-making process for planning actions	33	30.84
1. Administrator identity	1.4 Articulation of management practices	32	29.91
1. Administrator identity	1.5 Coordination of company areas	32	29.91
2. Specific knowledge	2.5 Systemic management	31	28.97
3. Competencies	3.6 Decision-making process for organizational actions	31	28.97
3. Competencies	3.4 Analytical thinking about the business environment	30	28.04
3. Competencies	3.8 Decision-making process for control actions	18	16.82

3.Competencies	3.7 Decision-making process for management actions	16	14.95
Total respondents		107	

Source: Prepared by the authors, based on the survey results

Thus, based on the answers obtained in the survey, it can be seen that, in the view of the Administration graduates, the most important/necessary management skills for working as a manager are people training, leadership and motivating teams and people.

These are followed by strategic management, conflict management, people management and adapting to change.

Scoring between 55 and 59% of the responses were vision of the whole, identifying problems, formulating and implementing solutions, innovation, professionalism, proactivity and ethics.

Scoring between 40 and 49% were management skills such as systemic/holistic vision of the organization, focus on results, commitment, management of finances and budget, ability to relate and creativity.

The 30-39% range includes continuous learning, sales and marketing management, optimizing the use of resources, logical thinking about the business environment, preparing and interpreting scenarios, critical thinking about the business environment and the decision-making process for planning actions.

Finally, scores between 20 and 29% and scores between 10 and 19% are for the articulation of management practices, coordination of company areas, systemic management, decision-making process for organizational actions, analytical reasoning about the business environment and decision-making process for control actions and decision-making process for management actions.

4.2 Analysis of the intersection between the competences developed in the administration course

In this way, based on the graduate profile and the necessary competences contained in the PPCA (2018) - MEC Curriculum Guidelines, the scope was reduced to 31 more specific competences, as shown in Table 2:

Table 2 - Competences needed by Business Administration graduates - PPCA (2018)

Recognizing and defining problems and opportunities, finding solutions, proposing actions in line with strategies, introducing changes to the production process, acting preventively
a) recognize and define problems and opportunities
b) find solutions
c) propose actions in line with strategies
d) introduce changes to the production process
e) acting preventively
Develop expression and communication compatible with professional practice, including in negotiation processes and interpersonal or intergroup communications
a) develop expression and communication compatible with professional practice
b) develop expression and communication compatible with negotiation processes
c) develop expression and communication compatible with interpersonal or intergroup communications
Reflect and act critically on the sphere of production, understanding its position and function in the productive structure under its control and management
a) reflect and act critically on the sphere of production, understanding its position and function in the productive structure under its control and management

Develop logical, critical and analytical reasoning to operate with values and mathematical formulations present in formal and causal relationships between productive, administrative and control phenomena, expressing themselves critically and creatively in different organizational and social contexts.
a) develop logical reasoning to operate with values and mathematical formulations present in formal and causal relationships between productive, administrative and control phenomena
b) develop critical reasoning to operate with values and mathematical formulations present in the formal and causal relationships between productive, administrative and control phenomena
c) develop analytical reasoning to operate with values and mathematical formulations present in formal and causal relationships between productive, administrative and control phenomena
d) express themselves critically and creatively in different organizational and social contexts
Have initiative, creativity, determination, political and administrative will, willingness to learn, openness to change and awareness of the quality and ethical implications of their professional practice
a) initiative
b) creativity
c) determination
d) political and administrative will
e) willingness to learn
f) openness to change, being an adaptable professional
g) awareness of the quality of their professional practice
h) awareness of the ethical implications of their professional practice
Develop the ability to transfer knowledge from everyday life and experience to the work environment and their field of professional activity, in different organizational models, proving to be an adaptable professional
a) develop the ability to transfer knowledge from everyday life and experience to the work environment and their field of professional activity, in different organizational models
Coordinating and integrating the different functional areas of organizations, identifying and allocating resources, people and functions
a) coordinating and integrating the different functional areas of organizations, identifying and allocating resources, people and functions
Developing human capital through leadership and teamwork within organizations, monitoring results and evaluating performance
a) developing human capital
b) leadership
c) teamwork
d) monitoring the results of the people in the team
e) evaluating the performance of the people in the team
Manage change and risk situations affecting organizations through a dynamic approach
a) manage risk situations affecting organizations
Develop entrepreneurial skills to design, implement and consolidate projects in organizations
a) develop entrepreneurial skills to design, implement and consolidate projects in organizations
Develop the ability to provide management and administration consultancy, administrative, managerial, organizational, strategic and operational advice and expertise
a) develop the ability to provide management and administration consultancy, administrative, managerial, organizational, strategic and operational advice and expertise

Source: Prepared by the authors, based on the graduate profile and the necessary competencies (PPCA, 2018).

In Table 3 shows the analysis/cross-referencing between the competencies developed in the administration course (according to the pedagogical project) and the competencies considered important/necessary for the Administration graduate to work as a manager.

Table 3 - Analysis/cross-referencing between the competences developed in the business administration course and the competences considered important/necessary

Management skills (SYSTEM CFA/CRA's NATIONAL SURVEY, 2015)	Total respondents (primary research)	Graduate profile and necessary competencies PPCA (2018)
1.1 Training people	73.83	developing human capital; monitoring the results of the people in the team; evaluating the performance of the people in the team
1.2 Leadership	71.96	leadership
1.3 Motivating teams and people	70.09	teamwork
2.3 Strategic management	68.22	
3.9 Conflict management	66.36	
2.1 Managing people	65.42	develop human capital; monitor the results of the people in the team; evaluate the performance of the people in the team
4.4 Adapting to change	65.42	develop human capital; monitor the results of the people in the team; evaluate the performance of the people in the team
4.2 Vision of the whole	55.14	
	54.21	recognizing and defining problems and opportunities; finding solutions; proposing actions in line with strategies
3.1 Identifying problems, formulating and implementing solutions	52.34	
	52.34	
4.6 Innovation	52.34	awareness of the ethical implications of their professional practice
	51.40	
1.6 Systemic/holistic view of the organization	49.53	
	49.53	
1.8 Focus on results	49.53	
	48.60	
5.2 Commitment	48.60	
	48.60	creativity
5.4 Continuous learning	36.45	willingness to learn
	35.51	
2.4 Sales and marketing management	34.58	
	34.58	
1.7 Optimizing the use of resources	32.71	develop logical reasoning to operate with values and mathematical formulations present in the formal and causal relationships between productive, administrative and control phenomena
	31.78	
3.2 Logical thinking about the business environment	30.84	
1.4 Articulation of management practices	29.91	
	29.91	coordinating and integrating the different functional areas of organizations, identifying and allocating resources, people and functions

1.5 Coordination of company areas	28.97	
	28.97	
2.5 Systemic management	28.04	develop analytical reasoning to operate with values and mathematical formulations present in formal and causal relationships between productive, administrative and control phenomena
3.8 Decision-making process for control actions	16.82	
3.7 Decision-making process for management actions	14.95	

Source: Prepared by the authors, based on the results of the survey and the graduate profile and necessary competencies (PPCA, 2018).

Based on the analysis/cross-referencing between the competencies developed in the administration course (according to the pedagogical project - MEC Curriculum Guidelines) and the competencies considered important/necessary for graduates in administration to work as managers, it can be seen that the three management competencies that scored highest in the survey results were: training people, leadership and motivating teams and people. These appear in the competencies developed in the administration course (according to the pedagogical project).

In the score range defined as between 40 and 49%, the managerial competences highlighted by the graduates in the survey are not clearly stated: systemic/holistic view of the organization, focus on results, commitment, management of finances and budget and ability to relate.

In the course's pedagogical project, the competences of sales and marketing management, optimizing the use of resources, preparing and interpreting scenarios and the decision-making process of planning actions are not clearly presented, in the score range between 30 and 39%.

Finally, the competences articulation of management practices, systemic management, decision-making process for organizational actions, decision-making process for control actions, decision-making process for management actions, even though they obtained a small number of responses in the survey of graduates (from 29 to 10%), are not explicitly verified in the section: "graduate profile and necessary competences contained in the PPCA (2018)".

Thus, the results obtained from the survey show that the competences considered most important by the graduates in their profession as administrators are listed with emphasis in the Pedagogical Project of the Administration course.

Final Considerations

Competence incorporates attributes linked to knowledge (knowing), skills (knowing how to do) and attitudes (willpower to transform theory into practice).

It is important to stress that the professional's competence must be linked to an academic environment that enables the development of various types of knowledge: acting with pertinence, mobilizing knowledge and expertise in a professional context; transposing, knowing how to integrate and combine multiple and heterogeneous types of knowledge; learning, learning to learn and getting involved. The competences desirable for managers, when they are not innate, need to be developed throughout the course, a development that presupposes the student as the subject of their own training process.

The specific objective of this study, which was to identify, in the view of graduates in Administration, the important/necessary management skills for working as a manager, resulted in the following: in the view of graduates, the most important/necessary management skills are people training, leadership and motivation of teams and people. In addition, the skills of strategic management, conflict management, people management and adapting to change were identified. The second specific objective sought to analyze/cross-reference the competencies developed in the business administration course (according to the pedagogical project - MEC Curriculum Guidelines) and the competencies considered important/necessary for the business administration graduate to work as a manager. Here, it was noted that the management competences that scored highest in the survey results: training people, leadership and motivation of teams and people, appear in the competences developed in the administration course. However, strategic management and conflict management do not appear clearly and explicitly in the pedagogical project. It was possible to observe, from the survey of the participants who made up the sample, that of the 33 competencies defined in a survey carried out in 2015 by the Federal Council of Administration, together with the Regional Councils, the results of which surveyed, among other aspects, the profile, training, performance and job opportunities of the administrator, 15 of them, or 45%, appear clearly and explicitly in the PPCA (2018), where the competencies of the graduate are based on the Curriculum Guidelines for Undergraduate Administration Courses (MEC).

As a continuation of this work, it is therefore suggested that an analysis/cross-check be carried out between the competences considered important/necessary for graduates in Administration to act as managers and the competences developed in the Administration course, according to the syllabuses and programs developed in the subjects on the curriculum. This will provide a broader view of the competences presented by the Administration course at the University of Caxias do Sul, covering not only the course's pedagogical project, but also the subjects that are part of the curriculum.

Based on this more refined and specific analysis, if there are still competences that are not included in the subjects on the curriculum, it is important to request a review of the pedagogical project at the University of Caxias do Sul. This review concerns the profile and competences required of graduates, so that the scope of the administration profession is even more in line with the needs of the professional market.

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QUALITY 4.0 IN THE METALWORKING SECTOR: EVALUATION OF READINESS IN SOUTHERN BRAZIL

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Abstract

The general objective of this research is to evaluate the readiness of quality 4.0 in companies in the metalworking sector of the Serra Gaúcha. The study uses as a research method quantitative descriptive research through a survey of 137 companies in the metalworking sector. The data collection instrument presents 6 dimensions of Quality 4.0 with 24 related variables using a Likert scale from 1 to 5 that has already been validated. Sampling is non-parametric. As for the results, frequency analysis, descriptive statistics, robust descriptive statistics, and the One-Way ANOVA (Non-parametric) test were applied. The results show that the level of readiness is: the dimensions of "Data and Analytics" and "Connectivity" showed similar results, with an overall average performance of 2.43, The "Management System" dimension showed superior performance, with an overall average result of 3.45, the dimensions of "Collaboration and Leadership" and "Compliance" also showed good results, with overall average results of 3.46 and 2.76, respectively, and lastly the "Scalability" dimension showed a lower performance, with an overall average result of 2.28. The results of the Kruskal-Wallis test indicate that there are significant differences between the means of the two data groups: 1. Group 1 (Low Maturity) vs. Group 2 (Mean maturity): $p = 0.087$; 2. Group 3 (High Maturity) vs. Group 4 (Very high maturity): $p = 0.027$. In conclusion, Quality 4.0 is a trend that is transforming the metalworking sector. Companies that adopt these technologies and practices strategically will be better positioned to compete in the global marketplace.

Keywords: Quality 4.0, Readiness, Metalworking sector.

1. Introduction

Quality 4.0 is described as a more holistic and proactive approach to quality management, which involves integrating all stages of the production and service process, from conception to delivery of the final product or service. This approach allows for greater visibility

and control over all processes, as well as greater responsiveness to problems and opportunities for improvement (Prashar, 2023; Broday, 2022; Martínez-Lorente, Dewhurst & Dale, 1998).

Quality management 4.0 uses advanced technologies, such as IoT sensors, to collect data in real time and monitor process performance, allowing for real-time problem detection and error correction (Jacob, 2020). In addition, data analysis allows you to identify patterns and trends, which can help improve the quality and efficiency of processes (Lakhe, & Mohanty, 1994). Quality 4.0 also allows for greater collaboration and exchange of information between the different departments of the company, such as quality, production, engineering, and customer service, making quality management more efficient and effective (Carvalho et al., 2021).

The metalworking sector in Rio Grande do Sul is one of the pillars of the economy, representing a significant portion of the industrial GDP, according to Fiergs¹. With an emphasis on the segments of automotive parts and components, machinery and equipment, metal products, and metallurgy, the state plays a key role in the national production of these sectors (Fiergs 2023).

The concentration of industrial companies in the metalworking sector of Rio Grande do Sul is evident, representing 12.5% of the national total. With a strong presence in the Metropolitan Region of Porto Alegre, followed by the Northeast and Northwest regions, Rio Grande do Sul stands out as a center of innovation and development in this industry, it is the second metalworking pole in Brazil, only behind São Paulo (Fiergs 2023). In this context, the key question of this research is: what will be the readiness for quality 4.0 in quality control and how will it affect different types of companies in the metalworking sector?

To answer this problem, the general objective of this article is to evaluate the readiness of quality 4.0 in companies in the metalworking sector of Serra Gaúcha. The methodology chosen for this study is research with a quantitative approach, for the purposes it is characterized as descriptive, having used an instrument adapted from Jacob (2020) where 6 dimensions of Quality 4.0 were evaluated, through a survey. The study is divided into: 1. Introduction, 2. Theoretical framework, 3. Research methodology, 4. Analysis and discussion of results and 5. Final considerations.

2. Theoretical framework

2.1 The Evolution of Quality Management: From Traditional Eras to Quality 4.0

The evolution of quality management over the ages has been a topic of great importance to organizations. From traditional quality management to quality 4.0, several approaches and methodologies have been developed to improve processes and achieve operational excellence.

In the era of traditional quality management, the main focus was on inspecting finished products. During this period, organizations sought to identify and correct defects after production. The approach was reactive, triggered only after failures occurred (Ferreira, Lustosa & Kogawa, 2023; Martínez-Lorente, Dewhurst & Dale, 1998).

With the dawn of the era of total quality management, there has been a paradigm shift. In this approach, quality became the responsibility of all employees, not just a specific department. Tools such as PDCA and FMEA have been developed to improve processes and prevent failures (Helmold, 2023; Lakhe & Mohanty, 1994).

At the beginning of the 21st century, the era of integrated total quality management has emerged. During this period, organizations have adopted integrated management systems, such as ISO 9001, which combine quality management with other aspects, such as environmental

¹ Foundation of Sesi Servers in Rio Grande do Sul

management and occupational safety management (Helmold, 2023). The idea was to seek excellence in all areas of the organization, promoting customer satisfaction and continuous improvement (Ferreira, Lustosa & Kogawa, 2023).

Wen, Sun and Yan (2022), argue that the progression of the quality of products and services is an ongoing and complex undertaking. This venture can be categorized into four distinct phases, each representing a unique perspective on quality and resulting in significant changes in business practices. These phases are the era of verification, the era of statistical quality control, the era of quality assurance, and the era of total quality management (Ferreira, Lustosa, & Kogawa, 2023; Prashar, 2023).

These phases do not replace each other but rather complement each other and form a continuous progression over time. In this context, the market has experienced an exponential and challenging increase in competitiveness, leading to the adoption of these approaches over the years as the main brands, adjusting to changes and innovations in their respective sectors (Helmold, 2023; Martínez-Lorente et al., 1998).

According to Lakhe and Mohanty (1994), each stage of the quality era has been shaped by the introduction of new philosophies and tools in the field of production, to meet market demands and customer expectations and needs. These changes were developed to improve internal performance through well-structured processes, employee training, and increased leadership engagement (Broday, 2022). One of the key distinctions between twentieth-century approaches and today's is that they can reflect the needs and desires of their customers, making management processes more efficient and effective, regardless of the size of the company (Wen et al., 2022).

This evolution has been driven by a shift in approach from product to customer, with a growing emphasis on quality as a competitive differentiator. Moreover, with the uninterrupted advancement of technology, quality management is becoming increasingly integrated, taking into account people, processes, and products as a whole, rather than in isolation (Prashar, 2023).

The evolution of quality management over the ages is an ongoing and complex process, driven by changing market demands and available technologies. Quality 4.0 is a holistic approach to quality management that incorporates the advances of the fourth industrial revolution, such as automation, artificial intelligence, and the Internet of Things (Broday, 2022; Jacob, 2020).

Quality 4.0 offers several benefits for organizations, such as:

1. Increased productivity: Process automation can free up human resources for more strategic activities, increasing productivity;
2. Quality improvement: The use of digital technologies can help identify and prevent defects, improving the quality of products and services;
3. Personalization: Data collection and analysis can help organizations understand customer needs and offer more personalized products and services.

Organizations that adopt quality 4.0 will be better positioned to compete in the global market, which is increasingly competitive and demanding (Prashar, 2023; Broday, 2022).

2.2 Quality 4.0

Sader, Husti and Daroczi, (2022), describe Quality 4.0 as the application of Industry 4.0 technologies within the scope of quality management. This integration manifests itself through the use of emerging technologies, such as Artificial Intelligence (AI), Internet of Things (IoT), Big Data, data analytics, machine learning, and Blockchain technology, to improve quality assurance, control, and management processes. Quality 4.0 assumes relevance in contemporary

quality management, for several reasons, since it enables organizations to achieve levels of efficiency and effectiveness in quality processes never before achieved.

Sader et al. (2022), in their study, identify the following characteristics of quality 4.0:

1. Merging digital and physical technologies: Quality 4.0 uses digital technologies, such as artificial intelligence, big data, and the Internet of Things, to monitor and control physical processes, identify and prevent defects, and improve the quality of products and services;
2. Customer focus: Quality 4.0 focuses on meeting individual customer needs by collecting and analyzing data and offering personalized products and services;
3. Data-driven decision-making: Quality 4.0 utilizes data to make informed decisions about all aspects of quality management, from product design to after-sales.

The study also discusses the following applications of quality 4.0:

1. Automated quality control: The use of sensors and artificial intelligence to monitor and analyze products and processes in real time, identifying and preventing defects;
2. Quality risk management: The use of big data to identify and assess quality risks, and develop mitigation plans;
3. Predictive maintenance: The use of data to predict when machines and equipment will need maintenance, preventing unexpected downtime in production;
4. Personalization of products and services: The collection and analysis of customer data to understand their preferences and offer personalized products and services.

The study also identifies some challenges to the adoption of quality 4.0, such as:

1. Investments in technology: Adopting quality 4.0 requires investments in digital technologies such as artificial intelligence, big data, and the Internet of Things;
2. Qualification of the team: The team needs to be qualified to use the new technologies and processes of quality 4.0;
3. Cultural change: Adopting quality 4.0 requires a cultural shift in the organization, with a focus on collaboration, innovation, and continuous improvement.

Quality 4.0 refers to the application of Industry 4.0 technologies in the field of quality management. This integration involves the use of emerging technologies such as Artificial Intelligence (AI), Internet of Things (IoT), Big Data, data analytics, machine learning, and Blockchain to improve quality assurance, control, and management processes (Carvalho et al., 2021). Quality 4.0 is important in modern quality management for several reasons, as it empowers organizations to achieve unprecedented levels of efficiency and effectiveness in quality processes (Prashar, 2023). It leverages digital tools to consistently deliver high-performance products while recognizing the importance of human engagement to ensure quality (Zonnenshain & Kenett, 2020).

Quality 4.0 is based on traditional quality methods and aims to redefine the meaning of quality excellence in the digital age (Carvalho et al., 2021). This approach is based on three main pillars: Merging digital and physical technologies: Quality 4.0 uses digital technologies to monitor and control physical processes, identify and prevent defects, and improve the quality of products and services Customer focus: Quality 4.0 focuses on meeting individual customer

needs by collecting and analyzing data and offering personalized products and services. Data-driven decision-making: Quality 4.0 utilizes data to make informed decisions about all aspects of quality management, from product design to after-sales (Jacob, 2020).

For Maganga and Taifa (2022), Quality 4.0 empowers organizations to become more flexible and agile. With the use of Big Data and data analytics, businesses can make quality decisions based on insights obtained from diverse data sources, allowing them to respond quickly to changing customer expectations or market conditions. However, the transition to Quality 4.0 presents challenges. Companies need to invest in technological infrastructure, develop digital skills, and ensure data security.

As far as future implications are concerned, Quality 4.0 will certainly continue to transform quality management. As technologies continue to evolve, organizations need to continuously adapt and innovate to take advantage of the opportunities offered by Quality 4.0. This approach represents a new frontier for quality management in the digital age. While it is associated with challenges, its potential benefits for improving the efficiency, transparency, and adaptability of quality processes are vast. Companies that can master Quality 4.0 will be well-positioned to thrive in the digital economy of the 21st century.

3. Research Methodology

Descriptive quantitative research is a methodological approach employed to examine and summarize numerical information. Its objective is to describe and synthesize the results of a sample, ensuring that these results are representative of the study population. In this context, descriptive quantitative research is useful to obtain accurate information and carry out monitoring on a specific topic or problem. Some of the main purposes of quantitative descriptive research include: describing demographic and behavioral characteristics of specific individuals or groups; identifying patterns and trends in large data sets; comparing different groups or conditions to identify identity differences; establishing correlations between variables to understand their mutual relationships; identify predictors of certain outcomes or behaviors (Kruger, 2023; Dalmoro & Vieira, 2013; Hair Jr. et al., 2009).

To conduct descriptive quantitative research, it is necessary to collect numerical data from a representative sample of the study population. These data are further organized and analyzed using statistical techniques such as frequency analysis and descriptive statistics (Petrelli & Petrelli, 2021). The results obtained are presented in report format, which includes tables, graphs, and figures to illustrate the findings (Santino, Da Silva & Penha, 2023). For data analysis and treatment, Jamovi and Excel software were used.

3.1 Instrument for data collection and operationalization of variables

The collection instrument was adapted from Dan Jacob (2020), in his study Quality 4.0 is a holistic approach to quality management that uses digital technologies to improve the quality of products and services in 10 dimensions. In this study, we used only 6 dimensions to assess Quality 4.0 readiness. It offers several benefits to businesses, such as increased productivity, improved quality, increased customer satisfaction, and reduced costs. To implement quality 4.0, it is important to define the objectives, select the appropriate technologies, train the team, implement the technologies and processes, and monitor and evaluate the results. Quality 4.0 is an important trend for companies that want to remain competitive in the global market. The dimensions of the study presented based on the topics mentioned in Dan Jacob's (2020) model are presented in Table 1.

Table 1. Quality 4.0 Dimensions and Their Application Examples

Dimension	Description	Application Examples
Demographics	Company Features	Identify customer segments with specific needs
Data & Analytics	Using data and analytics to improve quality	Identify quality issues, predict trends, and make informed decisions
Connectivity	The ability for businesses to connect with their customers, suppliers, and partners	Collect feedback on the quality of products or services
Management System	Company Management System	Ensure that the company is following quality standards
Collaboration and Leadership	Collaboration between the different departments and senior management leadership in quality management	Promote collaboration between different departments to improve quality
Compliance	Compliance with applicable laws and regulations	Conduct internal audits to ensure that products or services are compliant with applicable laws and regulations
Scalability	The company's ability to scale its management processes to meet growth demands	Utilize production and quality management tools and processes that are scalable to meet growth demands

Source: Prepared by the authors (2023)

The operationalization of quantitative variables using a Likert scale from 1 to 5 is an approach commonly used in social and psychological research to measure participants' attitudes, opinions, and perceptions (Matas, 2018). This scale allows researchers to obtain a numerical measure for each response, which facilitates statistical analysis of the data collected (Hair Jr. et al., 2009).

On a Likert scale of 1 to 5, participants are asked to indicate their degree of agreement or disagreement with a specific statement. The number 1 usually represents a "strongly disagree" response, while the number 5 indicates a "strongly agree" response. Intermediate numbers, such as 2, 3, and 4, are used to express varying degrees of agreement or disagreement (Dalmoro & Vieira, 2013).

By operationalizing quantitative variables using this scale, researchers assign numerical values to each response. For example, for a question about customer satisfaction, the answer "strongly agree" can be assigned to the value 5, while the answer "strongly disagree" can be assigned to the value 1. Intermediate responses are assigned proportional values between 1 and 5, depending on the degree of agreement or disagreement expressed by the participant (Dalmoro & Vieira, 2013).

Based on the responses collected, researchers can perform statistical analyses to identify trends, patterns, and relationships between the variables studied. These analyses may include calculations of mean, standard deviation, correlation, and hypothesis testing, depending on the research objectives (Petrelli & Petrelli, 2021; Matas, 2018).

Operationalizing quantitative variables using a Likert scale from 1 to 5 offers an effective way to quantify participants' perceptions and attitudes. This approach allows a robust statistical analysis and helps in the understanding of the phenomena studied, contributing to the production of valid and reliable knowledge in the areas of social and psychological research (Santino et al., 2023; Matas, 2018). Table 2 shows the operationalization of the variables regarding the Quality 4.0 dimension, type of scale, and number of variables for each dimension.

Table 2. Dimensions of Quality 4.0 and its evaluation

Dimension	Scale Type	Values	Variables
Demographics	Nominal	1 to 4	1. Function
		1 to 6	2. Length of time working in the company
		1 to 5	3. Company's time in the industry
		1 to 5	4. Main productive typology
Data & Analytics	Ordinal Likert	1 to 5	5. Anadadoaut
		1 to 5	6. Anadadosemiestr
		1 to 5	7. Usage RFID quality
		1 to 5	8. UsageIoDtransfer
Connectivity	Ordinal Likert	1 to 5	9. Descriptive displays
		1 to 5	10. ProvisionCPS
		1 to 5	11. CPSERP Integration
		1 to 5	12. Scanningquality control
Management System	Ordinal Likert	1 to 5	13. Strategicbase
		1 to 5	14. Horizontal IntegrationCPS
		1 to 5	15. Networkingclientquality
		1 to 5	16. DisplayKPIsquality
Collaboration and Leadership	Ordinal Likert	1 to 5	17. KPIsinterestleaders
		1 to 5	18. TechnologiesIndustry4.0Quality4.0
		1 to 5	19. Systematicvalidationrequirement
		1 to 5	20. Auditscompliance
Compliance	Ordinal Likert	1 to 5	21. ServicesAutomated Compliance
		1 to 5	22. Technologies used
		1 to 5	23. IoTAppliedproduction processes
		1 to 5	24. IoSadopted Solutions

Source: Prepared by the authors (2023)

Survey research is a technique used in social science to collect data on opinions, attitudes, behaviors, and characteristics of a population. It consists of distributing a questionnaire among a group of individuals, usually called a sample, to obtain information on a specific topic or theme (Kruger, 2023). The questionnaire can be applied through different channels, such as online, by phone, by email, or in person. The questions can be asked directly, indirectly, or through scales of choice. The results are then analyzed to identify patterns, trends, and relationships between the investigated variables (Hair Jr. et al., 2009).

The data was collected through a survey on social networks and messaging apps with quality professionals in companies in Serra Gaúcha. The survey was conducted from 06/25/2021 to 12/18/2021. This approach allows you to reach a diverse audience and gain valuable insights for analysis. Collecting data by survey on social networks and messaging apps offers advantages, such as speed and efficiency in obtaining responses. With the information collected, the researchers were able to analyze the perceptions and needs of professionals in the area of quality, contributing to the improvement of practices and strategies related to quality in companies in Serra Gaúcha.

3.2 Target population and sample

The population of a study is represented by a set of individuals of interest to the researcher, relevant to the research problem (Hair Jr. et al., 2009). The choice of the object of study for convenience is a common approach in scientific research. This choice is based on criteria of practicality and availability of the necessary resources to carry out the research. The

researcher chooses to study an object that is accessible and that can be feasibly investigated within the available resources (Kruger, 2023).

In this sense, the target population of the present study comprises companies from the metalworking sector of Serra Gaúcha linked to Simecs – Union of Metallurgical, Mechanical and Electrical Material Industries of Caxias do Sul and Region in the state of Rio Grande do Sul, Brazil (Simecs, 2023). Non-probability sampling is one in which the selection of population elements to compose the sample is not based on known probabilities. In this type of sampling, the researcher uses his or her judgment to choose the participants, taking into account specific criteria, convenience, or availability. Unlike probabilistic sampling, non-probability sampling does not allow the margin of error to be calculated and does not guarantee the statistical representativeness of the population (Hair Jr. et al., 2009). The sample consists of 137 cases from the metalworking sector.

4. Analysis and discussion of results

4.1 Demographics

Population demographics can provide valuable insights into the composition and structure of society. The analysis of these demographic data can reveal information about age, gender, income, level of education, profession, place of residence, marital status, household size, and nationality, among other aspects. This information is useful for businesses, government organizations, and other entities that want to understand how to improve the population and make informed decisions (Santino et al., 2023).

In the Function variable, the following data were recorded: 67 employees (48.9%), 21 coordinators (15.3%), 12 managers (8.8%), and 37 technicians (27.0%). Regarding the length of time working in the company, the data are as follows: 16 people (11.7%) have more than 21 years of work in the company, 51 people (37.2%) have up to 5 years of work, 13 people (9.5%) have 11 to 15 years of work, 15 people (10.9%) have 16 to 20 years of work, 32 people (23.4%) have been working for 6 to 10 years and 10 people (7.3%) did not answer or did not apply.

As for the company's time in the industry, the data are as follows: 23 people (16.8%) have more than 50 years of company in the industry, 37 people (27.0%) have 10 to 25 years of company in the industry, 46 people (33.6%) have 26 to 50 years of company in the industry, 24 people (17.5%) have less than 10 years of company in the industry, and 7 people (5.1%) did not answer or do not apply. Finally, in the Main production typology variable, the following data were recorded: 18 people (13.1%) are involved in custom engineering (ETO), 17 people (12.4%) are involved in custom assembly (ATO), 5 people (3.6%) did not respond or do not apply, 41 people (29.9%) are involved in production for stocks (MTS) and 56 people (40.9%) are involved in custom production (MTO).

4.2 Data and Analytics Dimension

Data and Analytics are fundamental concepts in the world of technology and business. Data refers to information collected and stored, which can be structured or unstructured. This data can be generated by users, devices, systems, and interactions in general (Sader et al., 2022). Analytics, on the other hand, is the process of turning this data into actionable insights through analysis and interpretation. It is the ability to extract value from data by identifying patterns, trends, and relationships between the information collected (Broday, 2022; Jacob, 2020).

The use of analytics allows organizations to make more informed decisions based on concrete data. This can be applied in a variety of areas, from marketing and sales to operations and product development (Carvalho et al., 2021).

The Anadadoaut variable has a mean of 2.20, median of 2, variance of 1.531, minimum value of 1, and maximum value of 5. In the Anadadosemiestr variable, the mean is 1.73, the median is 2, the variance is 0.787, the minimum value is 1, and the maximum value is 5. Regarding the variable UseRFIDquality, the mean is 2.15, the median is 2, the variance is 1.145, the minimum value is 1, and the maximum value is 5. In the UsoDtransferencia variable, the mean is 2.12, the median is 2, the variance is 1.301, the minimum value is 1, and the maximum value is 5. Finally, in the Descriptive Exhibits variable, the mean is 3.34, the median is 4, the variance is 2.139, the minimum value is 1, and the maximum value is 5. The data provide information on the central tendency, dispersion, and amplitude of values for each variable.

4.3 Connectivity dimension

Connectivity is a term that refers to the ability to establish connections and communication between different devices, systems, or networks. It plays a key role in the digital age, enabling the exchange of information, data sharing, and access to online resources. Connectivity can also refer to the ability of devices to communicate with each other, such as in the Internet of Things (IoT), where physical objects are connected to the Internet and can exchange data and commands. This enables process automation, remote monitoring, and the creation of smart environments (Maganga & Taifa, 2022).

The variable DispositionCPS has a mean of 2.77, median of 3, variance of 1.97, minimum value of 1, and maximum value of 5. In the CP SERP Integration variable, the mean is 2.20, the median is 2, the variance is 1.66, the minimum value is 1, and the maximum value is 5. Regarding the variable Digitalization-quality control, the mean is 2.56, a median of 2, a variance of 1.54, a minimum value of 1, and a maximum value of 5.

This descriptive data provides information on the central tendency, dispersion, and amplitude of values for each variable. The mean represents the mean value of the data, the median is the value that divides the distribution in half, the variance indicates the dispersion of the data about the mean, and the minimum and maximum values represent the lower and upper limits of the observed data (Hair Jr. et al., 2009).

4.4 Management system dimension

An industry management system is a set of processes, technologies, and people that work together to ensure the efficiency and effectiveness of the production of goods and services. The primary purpose of a management system is to coordinate and control all aspects of production, from the input of raw materials to the delivery of the final product to the customer (Wen et al., 2022; Lakhe & Mohanty, 1994).

The variable DispositionCPS has a mean of 2.77, median of 3, variance of 1.97, minimum value of 1, and maximum value of 5. In the CP SERP Integration variable, the average is 2.20, with a median of 2, variance of 1.66, minimum value of 1, and maximum value of 5. Regarding the variable Digitalization-quality control, the mean is 2.56, a median of 2, a variance of 1.54, a minimum value of 1, and a maximum value of 5.

These results suggest that, on average, participants showed a moderate disposition towards CPS (2.77), a moderate integration between CPS and ERP (2.20), and a moderate digitization of quality control (2.56). However, it is important to consider the variability of the data, indicated by the variance, which shows the dispersion of the values about the mean. This information can be useful in understanding the participants' perception of the different aspects evaluated and can provide insights to enhance CPS implementation, ERP integration, and digitization of quality control in a specific context.

4.5 Collaboration and leadership dimension

Collaboration and leadership are two essential concepts for a company's success. Collaboration refers to the ability to work together, share information and resources, and work as a team to achieve common goals. Leadership refers to the ability to guide, motivate, and guide team members to achieve their goals (Martínez-Lorente et al., 1998). The leader must have effective communication skills, be able to motivate and inspire the team, and have decision-making and problem-making skills (Zonnenshain & Kenett, 2020).

The variable DisplayKPIsquality has a mean of 3.93, median of 4, variance of 1.04, minimum value of 1, and maximum value of 5. In the variable KPIs, the mean is 3.90, the median is 4, the variance is 1.59, the minimum value is 1, and the maximum value is 5. Regarding the variable Industria4.0qualidade4.0, the mean is 2.55, a median of 2, a variance of 1.93, a minimum value of 1, and a maximum value of 5.

These results suggest that, on average, participants showed a display of quality-related KPIs at a moderate level (3.93), a leaders' interest towards KPIs also at a moderate level (3.90), and adoption of Industry 4.0 technologies for quality at a lower level (2.55). However, it is important to consider the variability of the data, indicated by the variance, which shows the dispersion of the values about the mean.

This information can be useful to understand the participants' perception of the different aspects evaluated and can provide insights to improve the display of KPIs, the interest of leaders, and the adoption of Industry 4.0 technologies for quality in a specific context.

4.6 Compliance dimension

Compliance is an important concept for companies, especially those operating in regulated sectors such as finance, healthcare, technology, and industry. Broadly speaking, Compliance refers to compliance with laws, regulations, standards, and policies that govern business activity (Helmold, 2023). Compliance is essential for businesses that want to operate ethically and transparently, ensuring that they are compliant with all applicable laws and regulations. To ensure compliance within an organization, it is important to establish clear policies and procedures, train employees, designate a compliance officer, conduct audits and reviews, implement a compliance management system, stay up-to-date with regulatory changes, and establish a disclosure reporting program (Maganga & Taifa, 2022).

The systematic validation requirement variable has a mean of 2.90, median of 3, variance of 1.64, minimum value of 1, and maximum value of 5. In the Compliance Audits variable, the mean is 2.93, the median is 3, the variance is 1.26, the minimum value is 1, and the maximum value is 5. Regarding the variable Automated compliance services, the mean is 2.55, a median of 3, a variance of 1.19, a minimum value of 1, and a maximum value of 5.

These results suggest that, on average, participants presented a requirements validation system at a moderate level (2.90), compliance audits at a moderate level (2.93), and automated compliance services at a lower level (2.55). However, it is important to consider the variability of the data, indicated by the variance, which shows the dispersion of the values about the mean. This information can be useful in understanding the participants' perception of the different aspects assessed and can provide insights to improve requirements validation systematics, compliance audits, and automated compliance services in a specific context.

4.7 Scalability dimension

Scalability is a crucial trait for any business that wants to grow and expand in the long run. However, many companies don't fully understand what scalability is and how they can achieve it. Scalability refers to a company's ability to adapt and grow in response to market demand or changes in the business. It means that a company can increase its production, delivery, or service capacity without compromising quality or efficiency (Jacob, 2020).

The variable Technologies used has a mean of 2.08, median of 2, variance of 1.54, minimum value of 1, and maximum value of 5. In the variable IoT applied productive processes, the mean is 2.33, a median of 2, a variance of 1.18, a minimum value of 1, and a maximum value of 5. Regarding the variable Solutions IoS adapted, the mean is 2.62, a median of 2, a variance of 1.78, a minimum value of 1, and a maximum value of 5.

These results suggest that, on average, participants reported the use of technologies at a low level (2.08), an application of IoT in production processes at a moderate level (2.33), and an adoption of IoT solutions at a moderate level (2.62). However, it is important to consider the variability of the data, indicated by the variance, which shows the dispersion of the values about the mean.

This information can be useful for understanding the participants' perception of the different aspects evaluated and can provide insights to improve the use of technologies, the application of IoT in production processes, and the adoption of IoT solutions in a specific context.

4.8 Robust Descriptive Analytics

Robust Descriptive is a statistical approach that aims to provide accurate and robust data, even in the presence of extreme values or missing data. This approach is especially useful when working with real-world data, which can be imperfect, inconsistent, and contain errors (Petrelli & Petrelli, 2021).

The main goal of Robust Descriptives is to provide a statistical description of the data that is resistant to the influence of outliers or anomalous values. Traditional descriptive statistics, such as mean, median, and standard deviation, can be highly sensitive to extreme outliers, which can lead to misleading summaries of the data. Robust Descriptives, on the other hand, use statistical methods designed to be more resistant to the influence of these extreme values, providing a more accurate and robust summary of the data (Petrelli & Petrelli, 2021).

The technique used in the Robust Descriptives analysis was the M estimate: This method involves using a different measure of central tendency, such as the median or mode, instead of the traditional mean. M-estimators are designed to be more robust for outliers and can provide a more accurate summary of the data (Petrelli & Petrelli, 2021). Table 3 shows the readiness assessment of the Quality 4.0 dimensions.

Table 3. Quality 4.0 Dimensions Readiness Assessment

Dimensions	Variables	Estimator		IF
Data & Analytics	5. Anadadoaut	M-estimator	2.14	0.1074
	6. Anadadosemiestr	M-estimator	1.69	0.0808
	7. Usage RFID quality	M-estimator	2.12	0.0895
	8. UseIoT Transfer	M-estimator	2.06	0.1247
	9. Descriptive displays	M-estimator	3.43	0.1765
	The overall average result of the dimension		2.43	0.5689
Connectivity	10. CPS Provision	M-estimator	2.71	0.1529
	11. CPSERP Integration	M-estimator	2.13	0.1121
	12. Scanning quality control	M-estimator	2.51	0.1141

	The overall average result of the dimension		2.43	0.1270
Management System	13. Strategic Basis	M-estimator	3.45	0.1488
	14. CPS Horizontal Integration	M-estimator	2.24	0.1051
	15. Network customer quality	M-estimator	3.96	0.1143
	The overall average result of the dimension		3.45	0.1227
Collaboration and Leadership	16. DisplayKPIsQuality	M-estimator	3.95	0.0874
	17. KPIsinterestsleaders	M-estimator	3.99	0.1791
	18. TechnologiesIndustry4.0Quality4.0	M-estimator	2.45	0.1568
	The overall average result of the dimension		3.46	0.1411
Compliance	19. Systematicvalidationrequirement	M-estimator	2.86	0.1291
	20. Audits	M-estimator	2.92	0.1128
	21. Services automated compliance	M-estimator	2.52	Nan
	The overall average result of the dimension		2.76	0.1209
Scalability	22. Technologies used	M-estimator	1.98	0.1834
	23. IoTAppliedproductive processes	M-estimator	2.30	0.0899
	24. Adopted Solutions	M-estimator	2.56	0.1334
	The overall average result of the dimension		2.28	0.1355

Source: Prepared by the authors (2023)

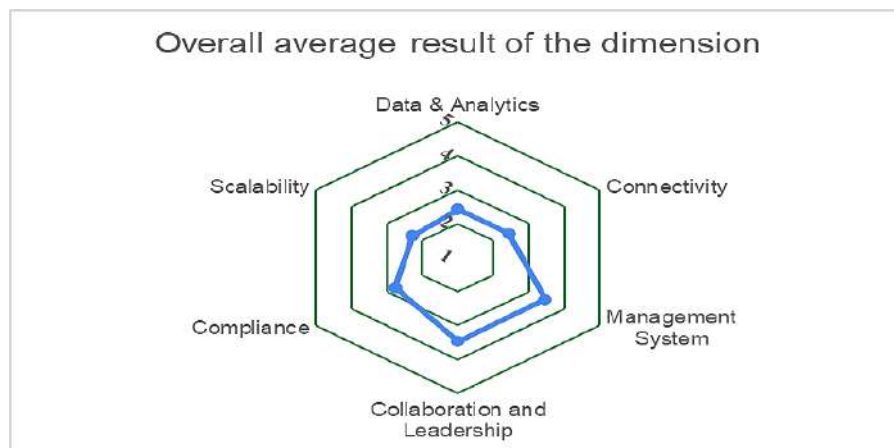
When analyzing the dimensions of the study, it is possible to observe that the "Data and Analytics" dimension presented an overall average result of 2.43, while the "Connectivity" dimension also obtained an overall average result of 2.43. This indicates that, in general terms, the organizations studied showed similar levels of performance in these two dimensions. However, the standard error (SE) was lower in the "Connectivity" dimension (0.1270) compared to the "Data and Analytics" dimension (0.5689), suggesting a higher accuracy in the results of the "Connectivity" dimension.

On the other hand, the "Management System" dimension presented an overall average result of 3.45, indicating a superior performance to the other dimensions studied. In addition, the standard error (SE) was relatively low (0.1227), which indicates greater reliability in the results of this dimension.

The "Collaboration and Leadership" dimension also had a high overall average result, with a value of 3.46. This suggests that the organizations analyzed performed well in this dimension. However, the standard error (SE) was slightly higher in this dimension (0.1411), indicating a lower precision in the results compared to the "Management System" dimension.

The "Compliance" dimension had an overall average result of 2.76, indicating an intermediate performance about the other dimensions. However, it is important to note that the "Automated compliance services" variable had a value of "NaN" for the standard error (SE), which indicates that the standard error for this particular variable could not be calculated.

Finally, the "Scalability" dimension obtained an overall average result of 2.28, suggesting a lower performance compared to the other dimensions studied. The standard error (SE) for this dimension was 0.1355, indicating a certain variability in the results. Figure 1 shows the Quality 4.0 readiness level for companies in the metalworking sector.

Figure 1. Quality Readiness Level 4.0

Source: Prepared by the authors (2023)

4.9 Cross-group analysis of Quality 4.0 readiness by type of company

For the analysis between groups, the One-Way ANOVA (Non-parametric) test was used, which is a statistical technique used to compare the mean of three or more groups of data, without assuming a normal distribution of the data. It is an alternative to the traditional ANOVA test, which is sensitive to violating the assumption of normality (Hair Jr. et al., 2009).

The One-Way ANOVA (Non-parametric) test is based on the classification technique, i.e., it classifies the data in descending order and calculates the mean and confidence interval for each group. The groups are then compared using the Kruskal-Wallis test, which is a non-parametric significance test (Hair Jr. et al., 2009).

The One-Way ANOVA (Non-parametric) test is used in cases where data are not normally distributed, or when normality cannot be assumed. It is commonly used in studies with data from behavior, education, psychology, and social sciences, among others (Hair Jr. et al., 2009). The Kruskal-Wallis test is a nonparametric test that can be used to compare group means when data are not distributed normally. The test is based on the χ^2 distribution, which is a continuous probability distribution (Hair Jr. et al., 2009).

Here's how the test works:

1. The data for each group is sorted in ascending order;
2. The value of the test statistic, H , is calculated;
3. The p-value is calculated using a χ^2 distribution table.

The test statistic, H , is calculated as follows:

$$H = (N * \sum(R_j - (R + 1)/2)^2) / (N(N + 1))$$

Where:

1. N is the total number of observations;
2. R_j is the sum of the ranks of the observations in group j ;
3. R is the sum of the ranks of all observations.

The p-value is calculated using a χ^2 distribution table, with degrees of freedom equal to the number of groups - 1. A p-value of less than 0.05 indicates that there is sufficient evidence

to reject the null hypothesis that there are no significant differences between the means of the groups. Table 4 shows the Kruskal-Wallis test.

Table 4. Table of Kruskal-Wallis test results for variables

Kruskal-Wallis				
Variables	χ^2	Df	p	ϵ^2
5. Anadadoaut	2.668	4	0.615	0.01962
6. Anadadosemiestr	2.826	4	0.587	0.02078
7. Usage RFID quality	4.128	4	0.389	0.03035
8. Use Transfer	4.906	4	0.297	0.03607
9. Descriptive displays	8.114	4	0.087	0.05966
10. CPS Provision	2.791	4	0.593	0.02052
11. CPSERP Integration	3.294	4	0.510	0.02422
12. Scanning quality control	1.742	4	0.783	0.01281
13. Strategic Basis	2.118	4	0.714	0.01557
14. CPS Horizontal Integration	1.301	4	0.861	0.00956
15. Network customer quality	5.076	4	0.280	0.03732
16. DisplayKPIsQuality	5.280	4	0.260	0.03882
17. KPIsinterestsleaders	5.962	4	0.202	0.04384
18. TechnologiesIndustry4.0Quality4.0	2.969	4	0.563	0.02183
19. Systematic validation requirement	2.187	4	0.701	0.01608
20. Audits	0.212	4	0.995	0.00156
21. Services automated compliance	10.959	4	0.027	0.08058
22. Technologies used	8.900	4	0.064	0.06544
23. IoTAppliedproductive processes	1.006	4	0.909	0.00740
24. Adopted Solutions	3.281	4	0.512	0.02413

Source: Prepared by the authors (2023).

Test 1: Group 1 (Low Maturity) vs. Group 2 (Medium maturity). The test statistic value for this test is 8.114. The calculated p-value is 0.087, which is less than 0.05. Therefore, we can conclude that there is sufficient evidence to reject the null hypothesis that there are no significant differences between the means of groups 1 and 2. This means that groups 1 and 2 have different means for at least one of the variables. An analysis of the values of χ^2 and ϵ^2 indicates that the variable "Technologies used" is the one that most contributes to the difference between the means of the groups.

The H-test statistic is relatively high for this test, which indicates that there is a significant difference between the means of groups 1 and 2. The p-value is also relatively low, which confirms that the difference is significant. The variable "Technologies used" is the one that most contributes to the difference between the means of groups 1 and 2. This means that companies with medium maturity tend to use more advanced technologies than companies with low maturity.

Test 2: Group 3 (High Maturity) vs. Group 4 (Very high maturity). The test statistic value for this test is 10.959. The calculated p-value is 0.027, which is less than 0.05. Therefore, we can conclude that there is sufficient evidence to reject the null hypothesis that there are no significant differences between the means of groups 3 and 4. This means that groups 3 and 4 have different means for at least one of the variables. An analysis of the values of χ^2 and ϵ^2 indicates that the variable "Automated compliance services" is the one that most contributes to the difference between the means of the groups.

The H-test statistic is very high for this test, which indicates that there is a significant difference between the means of groups 3 and 4. The p-value is also relatively low, which confirms that the difference is significant. The variable "Automated compliance services" is the one that most contributes to the difference between the means of groups 3 and 4. This means

that companies with very high maturity tend to use automated compliance services more frequently than companies with high maturity.

The results of the Kruskal-Wallis test indicate that there are significant differences between the means of the two groups of data:

1. Group 1 (Low Maturity) vs. Group 2 (Mean maturity): $p = 0.087$
2. Group 3 (High Maturity) vs. Group 4 (Very high maturity): $p = 0.027$

For the other groups, there is not enough evidence to reject the null hypothesis that there are no significant differences between the means. In general, the results of the table indicate that companies with greater maturity in quality management tend to use more advanced technologies and practices.

5. Final Thoughts

Quality 4.0 is a trend that is transforming the metalworking sector. Companies that adopt these technologies and practices strategically will be better positioned to compete in the global marketplace. In addition to being a benefit, the adoption of Quality 4.0 can also contribute to the sustainability of companies, through the reduction of the consumption of natural resources and the generation of waste. The adoption of Quality 4.0 can bring several benefits to companies in the metalworking sector, including:

1. Improved quality of products and processes;
2. Cost reduction;
3. Improved efficiency and productivity;
4. Increased customer satisfaction;
5. Improving competitiveness.

Quality 4.0 is a powerful tool that can help companies in the metalworking sector become more competitive and sustainable. In terms of managerial contributions, the study provides insights into the level of readiness of companies for Quality 4.0, identifying dimensions with superior performance and others that need to be improved. This can help organizations prioritize efforts and strategically allocate resources to improve their quality management processes and practices. The use of robust statistical techniques, such as robust descriptive techniques and the Kruskal-Wallis test, provided more accurate results, which can more effectively guide managerial decisions.

5.1 Limitation of research and future studies

As a research limitation, the use of only 6 dimensions from Jacob's (2020) study in this research, as the study uses 10 dimensions, is a limiter. Regarding the research method: Limited generalization: Descriptive quantitative research is limited to the population sample that is studied. Results cannot be generalized to other samples or the general population, as a sample may not be representative of the population; Lack of depth: A descriptive quantitative survey focuses on superficial characteristics of the sample, not allowing for a deeper analysis of the underlying factors that may be influencing the results and Limitations in data analysis: A descriptive quantitative survey may have limitations in data analysis, as data are usually described in terms of means and standard deviation, or that they cannot provide sufficient information about the variation of the data.

Recommendations for future studies, it would be interesting to expand the sample to include companies from other sectors, allowing for a broader comparative analysis. It would also be useful to carry out longitudinal studies, following the same companies over time, to assess the evolution of their readiness for Quality 4.0. Finally, it is recommended to deepen the analysis of each dimension studied, investigating which internal and external factors most influence the performance of companies. This can provide valuable insights into how to improve quality management practices in a more targeted and efficient way.

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