

Innovation in University Management: contributions of UFOB administrative technicians in identifying SIG/SIPAC demands

Inovação na Gestão Universitária: contribuições dos técnicos administrativos da UFOB na identificação de demandas do SIG/SIPAC

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Abstract

This article analyzes some contributions of Technical-Administrative Education (TAE) staff at Federal University of Western Bahia (UFOB) in identifying operational difficulties and technological demands related to SIG/SIPAC Platform use. The research, conducted with 45 staffs members through a questionnaire approved by UFOB Research Ethics Committee, indicated that 90% of participants recognized the need for support materials to ensure effective system use. In response to these demands, the study proposes technological solutions such as a technical support chatbot, an interactive manual with QR Codes, and the customization of dynamic reports. These solutions have high potential for legal protection through software registration, copyright, and licensing with National Institute of Industrial Property (INPI). Beyond intellectual property protection, the proposals can be implemented through university-company partnerships and technology transfer agreements. The suggested solutions contribute to administrative modernization and promoting open innovation in the public sector.

Keywords: Technological Innovation; SIG/SIPAC; Technology Transfer.

Resumo

Este artigo analisa as contribuições dos Técnicos Administrativos em Educação (TAEs) da Universidade Federal do Oeste da Bahia (UFOB) na identificação de dificuldades operacionais e demandas tecnológicas relacionadas ao uso da Plataforma SIG/SIPAC. A pesquisa, realizada com 45 colaboradores por meio de questionário aprovado pelo Comitê de Ética da UFOB, indicou que 90% dos participantes reconheceram a necessidade de materiais de apoio para o uso eficiente do sistema. Em resposta a essas demandas, o estudo propõe soluções tecnológicas como um *chatbot* de suporte técnico, um manual interativo com QR Codes e personalização de relatórios dinâmicos. Essas soluções têm potencial de proteção legal por meio de registro de *software*, direitos autorais e licenciamento junto ao Instituto Nacional da Propriedade Industrial (INPI). Além da proteção da propriedade intelectual, as propostas podem ser implementadas por meio de parcerias entre universidade-empresa e contratos de transferência de tecnologia. As soluções propostas contribuem para a modernização administrativa e a promoção a inovação aberta no setor público.

Palavras-chave: Inovação Tecnológica; SIG/SIPAC; Transferência de Tecnologia.

Technological Areas: Information and Knowledge Management, Digital Technologies Applied to Public Administration, and Innovation in Public Services.



1 Introduction

Technical and Administrative Staff in Education (TAEs) represent a strategic workforce within university management, particularly due to their direct involvement in operational routines and the daily use of systems such as SIG/SIPAC. Their practical experience and knowledge of institutional workflows make these professionals essential agents in identifying operational bottlenecks and proposing innovative solutions. Silva and Lima (2023) emphasize that actively listening to technical staff is fundamental to ensuring that institutional innovation aligns with the real needs of the university community.

According to Santos and Melo (2022), innovation in public university management involves the adoption of collaborative strategies, intensive use of digital technologies, and the promotion of a data-driven culture, contributing to a more transparent, integrated, and results-oriented administration.

According to the report published by the Brazilian Federal Court of Accounts (TCU, 2020), more than 70% of university managers identify excessive bureaucracy as one of the principal barriers to administrative efficiency. Such bureaucracy hinders innovation, slows decision-making processes, and limits the modernization of administrative procedures, directly affecting the quality of services provided to the academic community. Despite the importance of SIG/SIPAC, relatively few studies have examined the demands of Technical and Administrative Staff for system optimization, particularly in universities located in inland regions, such as the Federal University of Western Bahia (UFOB), which constitutes the focus of this study.

In accordance with the Brazilian Industrial Property Law (Law No. 9,279/1996) and the Copyright Law (Law No. 9,610/1998), the development of software applications, digital interfaces, technical manuals, and chatbots may be protected through software registration with the National Institute of Industrial Property (INPI), ensuring exclusive rights over the source code and functional architecture of the system. Copyright protection may also be applied to instructional materials, including technical manuals and digital flowcharts, while licensing agreements may facilitate the adaptation or transfer of these solutions to other public or private institutions.

Beyond legal protection, these solutions may be incorporated into institutional innovation policies and potentially explored through Partnership Agreements for Development (APDs) or technology licensing contracts, enabling replication across other universities that utilize the SIG/SIPAC platform. To support the development and implementation of such proposals, the establishment of university–industry partnerships is recommended, as

provided for under the Brazilian Legal Framework for Innovation (Law No. 13,243/2016). These partnerships may involve information technology companies interested in co-developing solutions, local startups capable of incubating or scaling the proposed technologies, and institutional Technology Innovation Centers (NITs) responsible for intellectual property registration, protection, and management. Furthermore, the adoption of open or shared licensing models may be considered as a strategy for expanding the dissemination of innovation throughout the federal public administration, thereby contributing to the modernization of administrative processes and aligning with the objectives of Brazil's Digital Government Strategy.

The Integrated Management System (SIG), particularly the Integrated System for Patrimony, Administration, and Contracts (SIPAC) module, has become an essential tool for standardizing and digitizing administrative processes within Brazilian federal universities. Developed by the Federal University of Rio Grande do Norte (UFRN), SIG/SIPAC supports the digital management of activities such as procurement requests, contracts, purchasing, asset management, and inventory control, promoting greater efficiency and institutional oversight.

According to the SIPAC User Guide (UFRN, 2021), the system provides a unified and auditable environment that reduces bureaucracy and facilitates process monitoring across multiple administrative sectors. However, the effectiveness of the system depends directly on user experience, the quality of training provided, and its ability to address the specific needs of each institution.

At UFOB, Technical and Administrative Staff have played a central role in this process by identifying operational limitations, proposing improvements, and contributing to the development of management support tools, including dynamic manuals, customized workflow diagrams, and technological innovation proposals.

Recognizing and valuing the contributions of administrative staff enables the implementation of innovative practices that are aligned with institutional realities. Carvalho and Souza (2022) argue that the collective development of solutions based on the practical experience of university staff strengthens institutional governance and promotes the long-term sustainability of proposed innovations.

This article: (i) analyzes the SIPAC bottlenecks reported by 45 Technical and Administrative Staff in Education (TAEs) at the Federal University of Western Bahia (UFOB); (ii) proposes three technological solutions, namely a digital manual, a chatbot, and a training platform; and (iii) discusses their potential for replication through Intellectual Property (IP) protection and Technology Transfer (TT) mechanisms.

2 Methodology

This research adopts an applied approach with a mixed-method design, integrating both qualitative and quantitative perspectives. It is characterized as a field study focused on addressing a specific institutional problem through the development of a technical product. The study was conducted within the context of the Federal University of Western Bahia (UFOB), Barreiras Campus, with particular emphasis on administrative practices related to the use of the Integrated Management System (SIPAC). As illustrated in the flowchart presented in Figure 1, the methodological framework outlines the research pathway and the operational stages undertaken throughout the study.

3 Results and Discussion

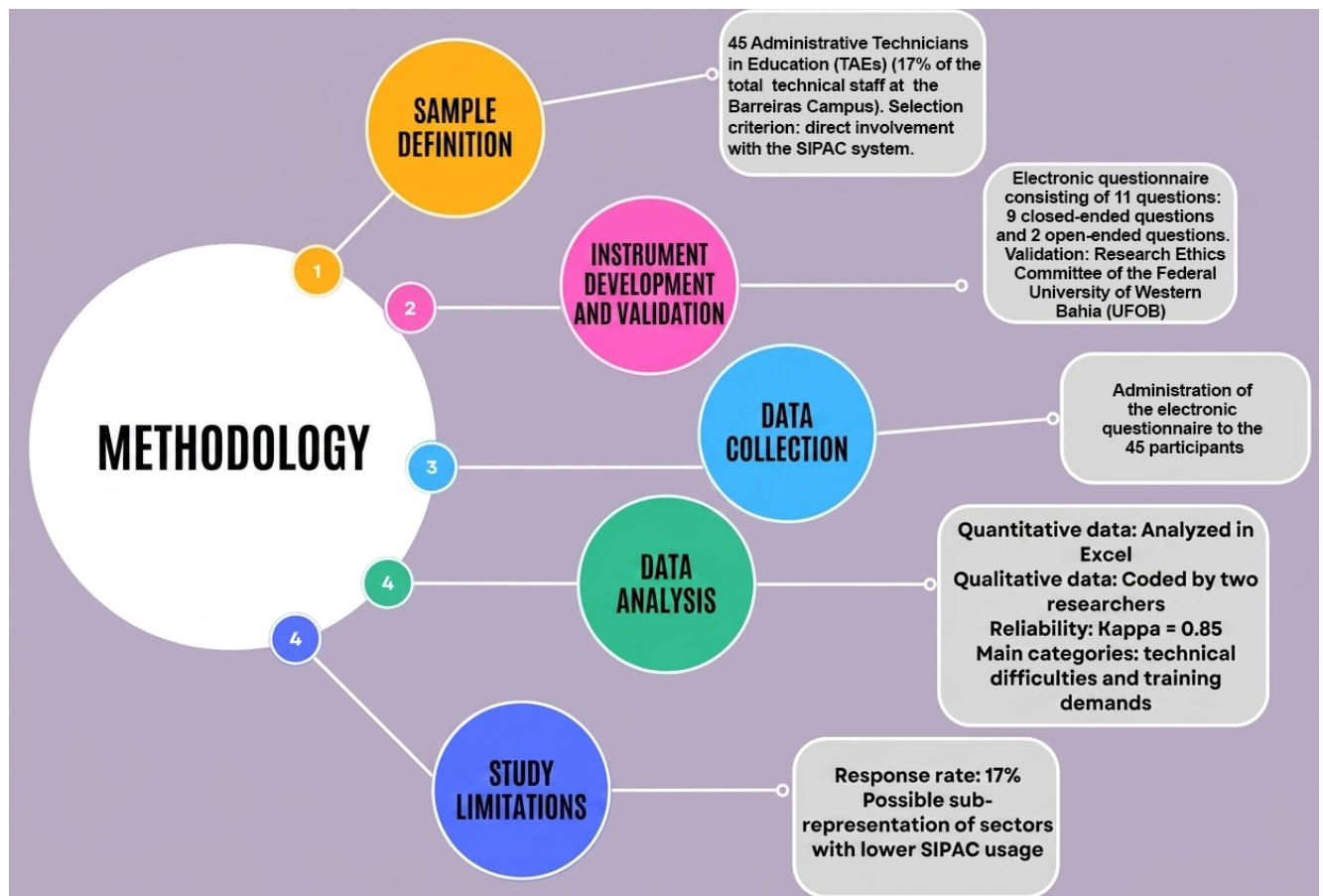
The results obtained through the questionnaire administered to the Technical and Administrative Staff in Education (TAEs) at the Federal University of Western Bahia (UFOB), Barreiras Campus, reveal key aspects

related to the use of the Integrated Management System (SIG), particularly the SIPAC module, and highlight opportunities for innovation in university management through the active engagement of administrative personnel.

As shown in Graph 1, the analysis of responses indicates that the majority of TAEs recognize the importance of SIG/SIPAC as an essential tool for the institution's administrative management. Nevertheless, recurring difficulties were identified regarding navigation between modules, the location of specific functionalities, and the execution of procedures involving multiple stages or interactions among different administrative sectors.

When asked about potential improvements and suggestions, the TAEs demonstrated a high level of engagement and practical knowledge, highlighting the need to revise operational workflows, improve integration among system modules, and implement user-support tools such as interactive tutorials and rapid-response support channels. As emphasized by Silva and Lima (2023), technical and administrative staff are strategic actors in identifying operational bottlenecks and proposing improvements

Figure 1 – Flowchart of the research methodology



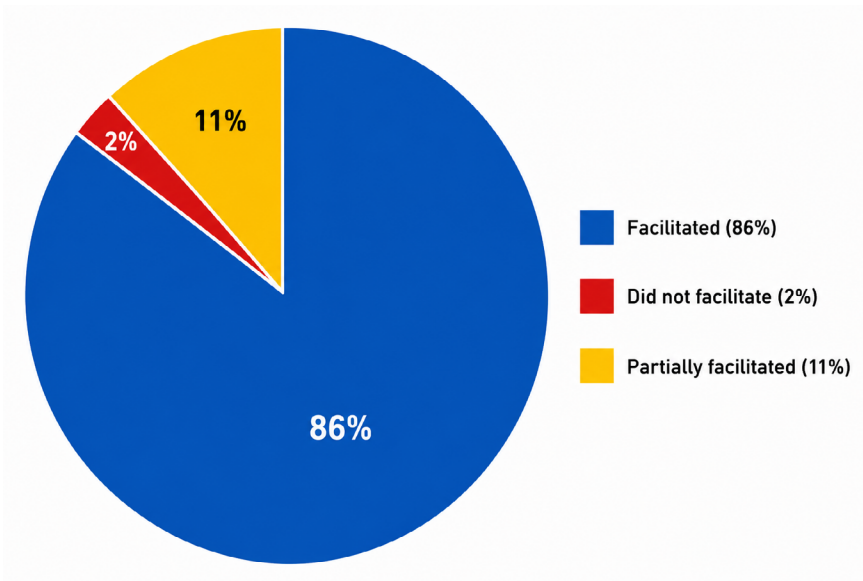
Source: Prepared by the authors (2025)

due to their direct involvement with institutional systems. The findings of this study support this perspective by revealing the ability of TAEs to critically identify systemic shortcomings and innovation opportunities based on their daily experiences.

The results presented in Graph 2 indicate that 79.5% of the technical and administrative staff at UFOB believe

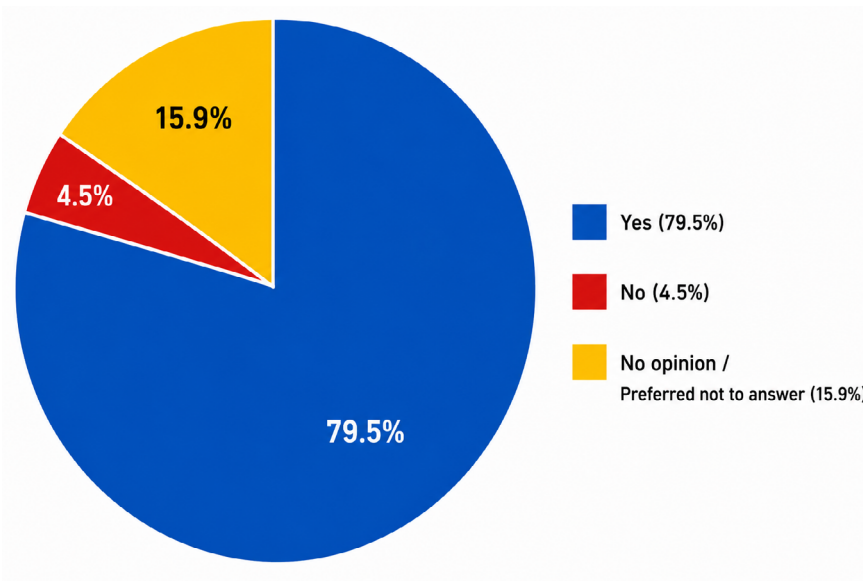
that the SIG Platform requires significant improvements to fully meet their operational needs. Only 4.5% consider the system satisfactory in its current form, while 15.9% either did not express an opinion or were unable to assess the platform. These findings reinforce the perception that, despite its institutional relevance, the system still presents usability and functionality challenges that affect the user experience and the efficiency of administrative processes.

Graph 1 – Responses from TAEs at UFOB, barreiras campus, regarding the extent to which the use of the sig platform facilitates their administrative tasks



Source: Prepared by the authors (2025)

Graph 2 – Responses from TAEs at UFOB, Barreiras Campus, regarding whether the sig platform requires improvements



Source: Prepared by the authors (2025)

The consideration of TAE demands is consistent with the concept of institutional innovation proposed by Santos and Melo (2022), who advocate the incorporation of collaborative practices and a data-driven culture into the improvement of public university management. Recognizing the technical and administrative expertise of staff members as a valuable input for strategic decision-making represents a significant advantage for organizational development. In this context, UFOB demonstrates a largely untapped potential for participatory management and user-centered innovation. The realization of this potential could be achieved through the institutionalization of permanent mechanisms for consultation and technical dialogue, such as administrative innovation committees, collaborative workshops, and process improvement laboratories.

These findings reinforce the perception that, although the SIG platform was an essential tool during the pandemic period, its structural and operational limitations continue to negatively affect employee performance. As discussed by Silveira and Fischer (2021), the emergency transition from in-person to remote work exposed vulnerabilities in institutional systems, particularly those lacking adequate technical support, continuous training programs, and updates aligned with the specific realities of educational institutions.

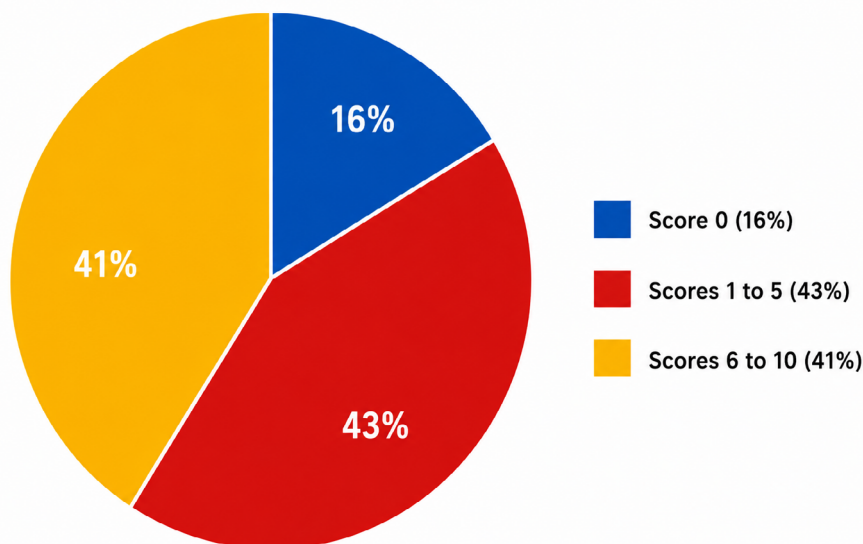
Graph 3 shows that 16% of respondents assigned a score of zero, indicating a complete absence of training; 43% assigned scores between 1 and 5, suggesting partial or insufficient training; and only 41% assigned scores between 6 and 10, indicating that they had received some level of

formal instruction regarding system use. These results reveal important gaps in the training process and suggest that the effectiveness of the platform is influenced not only by its technical characteristics but also by the quality and availability of user support and capacity-building initiatives.

According to UNESCO (2020), for digital technologies to play a transformative role in educational institutions, they must be accompanied by adequate infrastructure, continuous technical training, and effective pedagogical and administrative support. Within the context of UFOB, the survey findings indicate that the potential of the SIG Platform as a management tool has not yet been fully realized, largely due to the absence of institutional policies focused on user training and the customization of system functionalities to meet the specific needs of different administrative sectors. Carvalho and Souza (2022) argue that the collective development of solutions based on employees' practical experience strengthens institutional governance and contributes to the sustainability of proposed innovations. In this regard, the adoption of innovative practices grounded in the participation of Technical and Administrative Staff represents a viable and strategic pathway for strengthening university management at UFOB.

The results therefore reinforce the importance of implementing regular training programs and technical support initiatives, as well as developing accessible and context-specific educational resources, including operational manuals, tutorials, and practical workshops. Such initiatives not only enhance administrative efficiency but also contribute to strengthening employees' professional

Graph 3 – Responses from UFOB employees, Barreiras Campus, regarding whether they consider themselves adequately trained to effectively use electronic systems and understand the associated administrative processes



Source: Prepared by the authors (2025)

identity by recognizing and valuing the institutional knowledge developed through their daily public service activities.

The open-ended responses were systematized in Box 1, highlighting the principal challenges identified by participants. These findings reflect a scenario of fragile technological modernization within the public sector, characterized by the implementation of digital systems without adequate planning for training and support, as discussed by Hekscher, Cunha, and Miranda (2020). Although the accelerated adoption of digital technologies during the pandemic was necessary, it also exposed longstanding deficiencies in institutional training processes and communication workflows.

Furthermore, Silveira and Fischer (2021) emphasize that the abrupt transition from face-to-face to digital work environments generated significant challenges within public institutions, particularly due to insufficient employee preparation and the absence of clear operational guidelines. The lack of standardized procedures and accessible manuals, combined with the complexity of the SIG Platform, compromised the efficiency of administrative activities and increased workloads for many employees, especially those with limited familiarity with digital tools.

The need for an instructional manual to guide the use of the SIG Platform was widely recognized, with 93% of respondents considering such a resource essential. When asked which information should be considered indispensable in an Instruction Manual for Conducting Administrative Activities through the SIG Platform, employees highlighted several priority aspects. Among the most frequently mentioned were detailed explanations of the functionalities of each module, access to updated training opportunities offered by the responsible sector, comprehensive guidance on the stages involved in each

type of administrative process, and clear instructions for initiating procedures, with particular emphasis on the correct selection of process categories.

Respondents also stressed the importance of including flowcharts and screenshots illustrating system functionalities, as well as procedures related to attendance registration. Additional suggestions included explanations of the purpose of each system icon, guidance on document-type registration, and detailed instructions on how to search for administrative processes, stakeholders, memoranda, and related records. Finally, participants proposed that each administrative sector develop its own customized manual addressing the specific procedures and functionalities associated with the modules used in its daily operations.

In light of these findings, the urgent need to restructure the implementation and use of the SIG Platform becomes evident. Such efforts should focus on valuing institutional knowledge, actively incorporating the perspectives of Technical and Administrative Staff, and investing in continuous professional development strategies.

Despite these challenges, employees reiterated that the SIG Platform facilitated their administrative activities during the remote work period to some extent. This finding reinforces the notion that, although the system is functional, it requires adjustments and greater alignment with institutional demands.

The limitations identified in this study underscore the urgency of initiatives aimed at strengthening both users' technical mastery of the platform and the recognition of institutional expertise. Within this context, three proposals with the potential to directly impact management modernization and address the identified limitations are presented.

The first proposal consists of an Interactive SIPAC Training Platform, conceived as an institutional digital

Box 1 – Challenges faced by UFOB Barreiras Campus employees in understanding and using electronic systems (sig) in their remote work routine

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| General guidance regarding the types of documents, administrative processes, and protocols required for each type of procedure. |
| Lack of information, particularly in atypical or non-standard cases. |
| Insufficient training opportunities to enable TAEs to fully utilize all functionalities available within the system. |
| Need for standardization in system usage and the establishment of clearly defined operational routines within SIPAC. |
| Limited availability of system modules, underutilization of existing modules, and inadequate communication among departments and staff members involved in complementary activities. |
| Presence of obsolete features within the platform, restricted access to functionalities, and dependence on other departments for authorization or execution of activities assigned to TAEs. |
| The greatest challenge is keeping employees up to date with new system updates and modifications. |
| Difficulties in understanding and effectively using specific system commands and tools |

Source: Prepared by the authors (2025)

educational product designed to provide online training for system users. The second proposal involves a Dynamic Technical Manual Integrated with QR Codes, incorporating audiovisual resources accessible through QR codes that connect textual content to demonstration videos and practical tutorials. This solution can be easily adapted to different institutional contexts through the customization of content and operational workflows specific to each university. Moreover, it modernizes traditional PDF or printed manuals, making consultation more intuitive, interactive, and aligned with contemporary user expectations. Its multimedia nature also supports its classification as an educational product eligible for copyright protection.

The third proposal is the development of an Internal Operational Support Chatbot capable of automatically answering the most common questions related to SIPAC usage. This solution offers substantial scalability, as it can be replicated with minimal adjustments to the knowledge base and question-and-answer routines, facilitating deployment across different institutional environments and management systems.

The proposed solutions demonstrate significant potential for technology transfer to other universities, particularly those utilizing the SIG/SIPAC Platform or similar institutional systems, such as the University of Brasília (UnB), which uses SIGAA, and the Federal University of Rio Grande do Norte (UFRN), which employs SIG/SIPAC. In this context, registration as a computer program with the National Institute of Industrial Property (INPI) represents the most secure and feasible protection strategy, particularly because similar models are already adopted by multiple institutions.

The replicability and flexibility of these solutions contribute to the dissemination of best practices in electronic management and strengthen the innovation ecosystem within the Brazilian federal public administration. These initiatives are aligned with the principles of the Digital Government Strategy, supporting digital transformation and the modernization of university management nationwide.

The recommended licensing models include: adoption licensing, which allows other institutions to use the product through formal authorization and appropriate attribution to the developing institution; open-source licensing, which distributes the solution under a public institutional license, promoting open and collaborative innovation; and commercial licensing, which permits the transfer of usage rights in exchange for financial compensation or other forms of consideration, particularly when customized developments or dedicated technical support are required.

4 Final Considerations

The present study aimed to analyze the use of the SIG Platform, particularly the SIPAC module, by Technical and Administrative Staff in Education (TAEs) at the Federal University of Western Bahia (UFOB), Barreiras Campus, identifying operational difficulties, the most frequently used functionalities, training needs, and opportunities for technological and institutional innovation. The findings demonstrate that TAEs play a fundamental role in identifying demands and proposing improvements related to the use of the SIG/SIPAC Platform. The contributions collected reflect a substantial accumulation of practical experience and institutional knowledge that, if properly incorporated into management practices, can generate significant gains in efficiency, usability, and service quality.

The analyzed data indicate that although the SIG/SIPAC Platform represents an important advancement in university management, significant barriers remain regarding system usability, disparities in technical knowledge among employees, and the absence of adequate support materials. The lack of continuous training and accessible technical documentation limits user autonomy and contributes to delays in administrative processes.

Within this context, the proposal to develop a well-structured Technical Manual emerges as a concrete response to the demands identified in this study, with the potential to promote procedural standardization, facilitate the training of new employees, and preserve valuable institutional knowledge.

Furthermore, the incorporation of technological resources such as QR codes, chatbots, and structured learning pathways can expand the reach and effectiveness of this initiative, bringing employees closer to an organizational culture centered on innovation and continuous learning.

It can therefore be concluded that investing in the systematization and dissemination of knowledge related to SIPAC use not only enhances the performance of TAEs but also contributes to improving the efficiency, transparency, and quality of public university management. Future institutional actions should prioritize collaborative initiatives for the development of training materials, as well as permanent technological capacity-building strategies tailored to the realities and needs of university employees.

By recognizing the importance of active listening and participatory management, this study reinforces the need to value technical and administrative staff as integral actors within innovation policies in higher education.

The technological proposals presented offer viable and sustainable pathways for improving institutional systems, promoting greater employee autonomy, and supporting more informed and effective decision-making processes.

5 Future Perspectives

The implementation and continuous updating of technical manuals represent a promising avenue for organizational innovation, particularly when enhanced through interactive technologies such as dynamic QR codes, support chatbots, and online learning pathways. These solutions contribute significantly to the development of an institutional culture centered on continuous learning, knowledge sharing, dissemination of best practices, and the ongoing improvement of university administration. Moreover, they provide greater autonomy for users of integrated management systems.

To ensure the consistent and sustainable implementation of this proposal, a progressive action plan should be established. The first stage should involve the prototyping of a technical support chatbot, prioritizing the SIG/SIPAC modules most frequently used during 2024. This should be followed by the development and continuous updating of an interactive technical manual integrated with linked QR codes. In a subsequent phase, these solutions should be validated with Technical and Administrative Staff in Education (TAEs) through practical workshops and pilot testing, ensuring that the final products effectively address users' actual needs. During this period, online learning pathways should also be incorporated into internal training programs to promote the continuous development of employees' digital competencies.

The next stage, approximately one year later, would involve expanding these tools to other campuses within the institution, accompanied by ongoing professional development initiatives. The long-term sustainability of the proposed solutions should be ensured through the creation of a Management Committee composed of representatives from the TAEs, the Information Technology department, and university administration. This committee would be responsible for conducting semiannual reviews and updates of content and functionalities, ensuring that the tools remain aligned with organizational and technological changes.

These initiatives not only strengthen institutional efficiency but also align directly with important public policies and national strategic programs. The proposals are consistent with the Personnel Development Plan (PDP), established by Normative Instruction No. 201/2019, which promotes the continuous training of public servants, and with the Management and Performance Program (PGD),

regulated by Decree No. 10,506/2020, which encourages the adoption of digital solutions to improve public management. Furthermore, the proposal contributes to the objectives of the Digital Government Strategy (EGD), which seeks to digitally transform public services, and can be integrated into the Ministry of Education's Digital Capacity-Building initiatives aimed at modernizing university administration. From an innovation perspective, the proposal is also aligned with the National Intellectual Property Strategy (ENPI), which seeks to foster the development and protection of technological assets within the public sector.

Regarding intellectual property and technology transfer, the technical support chatbot, as a software-based solution, may be registered as a computer program with the National Institute of Industrial Property (INPI), in accordance with Law No. 9,609/1998. Such registration provides legal protection and exclusive rights over the software. Although software is generally not patentable under Brazilian law, registration with INPI provides legal support for institutional exploitation of the technology and may facilitate its licensing to other Higher Education Institutions (HEIs), whether public or private, through usage agreements. This transfer process may be managed by the institution's Innovation Agency in accordance with the provisions of the Innovation Law (Law No. 10,973/2004), creating opportunities for institutional revenue generation and strategic partnerships.

In addition to their legal and technological feasibility, the proposed solutions are supported by successful experiences at other Brazilian universities. For example, the Federal University of Santa Catarina (UFSC) reported an approximate 30% reduction in on-site and remote technical support requests following the implementation of QR codes within its SIGAA manuals. The Federal University of Ceará (UFC) implemented an institutional chatbot that provides automated guidance on administrative procedures, improving response times and reducing rework. Similarly, the Federal University of Minas Gerais (UFMG) incorporated online learning pathways integrated with its management systems, increasing employee participation in internal digital training programs. These experiences demonstrate that the adoption of similar solutions can generate tangible benefits in terms of efficiency, autonomy, and the improvement of institutional workflows.

Beyond their operational and educational advantages, the proposed solutions also contribute to environmental sustainability by reducing paper consumption and optimizing administrative processes. As such, they are aligned with the Sustainable Development Goals (SDGs), particularly those related to responsible consumption and production. Consequently, the solutions presented in this

study represent viable, innovative, and sustainable strategies for strengthening university management and fostering a more autonomous, efficient, and technologically integrated institutional environment.

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