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USER PERCEPTIONS ABOUT THE QUALITY OF INFORMATION SYSTEMS IN PUBLIC UNIVERSITIES: A CASE STUDY AT UFRRJ

AS PERCEPÇÕES DOS USUÁRIOS SOBRE A QUALIDADE DE SISTEMAS DE INFORMAÇÃO EM UNIVERSIDADES PÚBLICAS: UM ESTUDO DE CASO NA UFRRJ

PERCEPCIONES DE LOS USUARIOS SOBRE LA CALIDAD DE LOS SISTEMAS DE INFORMACIÓN EN LAS UNIVERSIDADES PÚBLICAS: UN ESTUDIO DE CASO EN LA UFRRJ

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ABSTRACT

This article addresses the perceptions of users of information systems at the Federal Rural University of Rio de Janeiro (UFRRJ), focusing on assessing the quality of the SIGAA, SIPAC, and SIGRH systems. This quantitative-qualitative and exploratory research was based on the criteria of the ISO/IEC 25010 quality model. The objective was to analyze the perceptions of students, faculty, and technical-administrative staff regarding the quality characteristics of the systems, in order to generate an evaluative opinion on their customization and usability. The results, focused on SIGAA, indicate that, for most users, the system is functionally adequate, but presents serious deficiencies in stability and performance during periods of high demand, such as enrollment. There is also a widespread perception of the need for improvements in the graphical interface and information organization. Continued research is essential to analyze other systems and deepen the understanding of the needs of the academic community, aiming to contribute to the university's Information and Communication Technology Coordination (COTIC).

Keywords: Software Quality. Information Systems. ISO/IEC 25010. Public Sector. UFRRJ.

RESUMO

O presente artigo aborda a percepção dos usuários de sistemas de informação na Universidade Federal Rural do Rio de Janeiro (UFRRJ), com foco na avaliação da qualidade dos sistemas SIGAA, SIPAC e SIGRH. A pesquisa, de natureza quanti-qualitativa e

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exploratória, utilizou como base os critérios do modelo de qualidade da norma ISO/IEC 25010. O objetivo foi analisar as percepções de discentes, docentes e técnico-administrativos sobre as características de qualidade dos sistemas, a fim de gerar um parecer avaliativo sobre sua customização e usabilidade. Os resultados, focados no SIGAA, indicam que, para a maioria dos usuários, o sistema é funcionalmente adequado, mas apresenta graves deficiências de estabilidade e desempenho em períodos de alta demanda, como matrículas. Há também uma percepção generalizada da necessidade de melhoria na interface gráfica e na organização das informações. A continuidade da pesquisa é fundamental para analisar os demais sistemas e aprofundar o entendimento sobre as necessidades da comunidade acadêmica, visando contribuir com a Coordenadoria de Tecnologia da Informação e Comunicação (COTIC) da universidade.

Palavras-chave: Qualidade de Software. Sistemas de Informação. ISO/IEC 25010. Setor Público. UFRRJ.

RESUMEN

Este artículo aborda las percepciones de los usuarios de los sistemas de información de la Universidad Federal Rural de Río de Janeiro (UFRRJ), centrándose en la evaluación de la calidad de los sistemas SIGAA, SIPAC y SIGRH. Esta investigación exploratoria, cuantitativa y cualitativa, se basó en los criterios del modelo de calidad ISO/IEC 25010. El objetivo fue analizar las percepciones de estudiantes, docentes y personal técnico-administrativo sobre las características de calidad de los sistemas, con el fin de generar una opinión evaluativa sobre su personalización y usabilidad. Los resultados, centrados en SIGAA, indican que, para la mayoría de los usuarios, el sistema es funcionalmente adecuado, pero presenta serias deficiencias en estabilidad y rendimiento durante períodos de alta demanda, como la matrícula. También existe una percepción generalizada de la necesidad de mejoras en la interfaz gráfica y la organización de la información. Es fundamental continuar la investigación para analizar otros sistemas y profundizar en la comprensión de las necesidades de la comunidad académica, con el fin de contribuir a la Coordinación de Tecnologías de la Información y la Comunicación (COTIC) de la universidad.

Palabras clave: Calidad del Software. Sistemas de Información. ISO/IEC 25010. Sector Público. UFRRJ.

1 INTRODUCTION

Information Systems (IS) and Information Technology (IT) represent major challenges and opportunities for the public sector. Gradually, the Brazilian government has invested in the development and acquisition of technologies to improve the services provided to citizens (VISHANTH, 2012). In the context of public universities, these systems are essential tools for academic and administrative management. The Federal Rural University of Rio de Janeiro (UFRRJ) has been going through a process of implementation and customization of integrated systems, such as the Integrated System for the Management of Academic Activities (SIGAA), the Integrated System for Assets, Administration and Contracts (SIPAC) and the Integrated System for Human Resources Management (SIGRH).[1]

To ensure that IT investments result in effective improvements, it is crucial to evaluate the quality of the systems implemented. An IS can be defined as "a set of interrelated components that collect (or retrieve), process, store, and distribute information intended to support an organization's decision-making, coordination, and control" (LAUNDON; LAUNDON, 2010). The quality of an IS, in turn, is intrinsically linked to the quality of the software that composes it (MOTTA, 2017).

In view of this, this article addresses the evaluation of the quality of the systems implemented at UFRRJ, specifically SIGAA, from the perspective of its main users: students, professors and technical-administrative staff. The study aims to contribute to the academic community and, in particular, to the Coordination of Information and Communication Technology (COTIC), providing a diagnosis based on an internationally recognized quality standard.

2 RATIONALE

The evaluation of IS quality in public organizations is a relevant field of study, however, it still has a modest number of studies, especially those that adopt criteria based on established standards such as the norms of the International Organization for Standardization (ISO) (ISO, 2011). This study is justified by filling part of this gap by applying the ISO/IEC 25010 quality model to analyze systems in a federal university.

In addition, the research offered an instrument for the continuous improvement of the services provided by COTIC to the academic community. By collecting and analyzing the perception of users, the work can guide actions to improve the customization, conduction and usability of the systems. Indirectly, the improvement in the quality of IS can lead to an

improvement in the services that the university provides to society (MELO; ARAÚJO; CEOLIN, 2020).

The work also aimed to raise awareness in the academic community about the importance of their active participation in the process of evaluating and improving the systems, transforming passive users into partners of the IT team. Finally, it represents an opportunity for undergraduate students to apply theoretical knowledge in practice, developing skills in academic research and understanding the complexity of the activities involved.

3 OBJECTIVES

The general objective of the research was to investigate the perception of students, professors and technical-administrative staff of UFRRJ about the quality of the information systems that have been implemented and customized in the institution, with a focus on SIGAA, SIPAC and SIGRH.

To achieve this general objective, the following specific objectives have been defined:

- ✓ To review the literature on IS quality assessment in public agencies and universities, with emphasis on quality criteria and methods of data collection and analysis.
- ✓ Build instruments to collect information on the quality of the systems in question, based on the ISO/IEC 25010 standard.
- ✓ Apply the instruments to collect users' perceptions of the quality of the systems.
- ✓ Perform statistical treatment and content analysis of the data collected.
- ✓ Describe, discuss and present the results obtained, providing a diagnosis on the quality of the SIGRH, SIPAC and SIGAA systems.

Although the research addresses all the systems that were being customized, this article focuses on the results related to SIGAA.

4 THEORETICAL FOUNDATIONS

4.1 INFORMATION SYSTEM AND INFORMATION TECHNOLOGY IN THE PUBLIC SECTOR

IT is an essential component for modern organizations, encompassing the hardware and software necessary to achieve their objectives (LAUDON; LAUDON, 2015). Its importance in public management is undeniable, being a key factor for the modernization of services, government transparency and administrative efficiency (SENA; GUARNIERI, 2015). The evaluation of the quality in the provision of government services has been a

constant motivation for studies, and the quality of IS is often pointed out as a direct indicator of the quality of these services (RAMPELOTTO; LÖBLER; VISENTINI, 2015).

Integrated systems, also known as Enterprise Resource Planning (ERP), are widely used to unify business processes in areas such as finance, human resources, and, in the case of universities, management of academic activities. SIGAA is an example of an integrated system that centralizes information in a single data repository, accessible by different parts of the institution (LAUDON; LAUDON, 2015).

4.2 SOFTWARE QUALITY AND THE ISO/IEC 25010 STANDARD

Software quality can be defined as compliance with functional and performance requirements, development standards, and implicit characteristics expected of professional software (PRESSMAN, 2011). The evaluation of this quality must be carried out based on professional standards and norms.

The ISO/IEC 25010 standard (ISO, 2011) is a standard that sets a standard for software product quality and quality in use. The product quality model is composed of eight characteristics:

1. **Functional Adequacy:** Ability to provide functions that meet explicit and implicit needs.
2. **Performance Efficiency:** Performance relative to the amount of resources used.
3. **Compatibility:** Ability to exchange information and share resources with other systems.
4. **Usability:** Ability to be used by specific users to achieve goals effectively, efficiently, and satisfactorily.
5. **Reliability:** Ability to maintain a specified level of performance.
6. **Security:** Ability to protect information and data from unauthorized access.
7. **Maintainability:** The ease with which the system can be modified for improvements, corrections, or adaptations.
8. **Portability:** Ability to be transferred from one environment to another.

Quality in use, in turn, refers to the user's perception of interacting with the system in a specific context, covering aspects such as effectiveness, efficiency, satisfaction, and absence of risk. ISO/IEC 25010 represents an evolution of the previous standard, ISO 9126, notably by raising "Safety" from a sub-characteristic to a main characteristic, giving it greater emphasis (DUARTE et al., 2010).

4.3 SYSTEMS ASSESSMENTS IN THE PUBLIC SECTOR WITH ISO 25010

Despite its importance, the application of standards such as ISO/IEC 25010 in the evaluation of IS in the Brazilian public sector is still incipient. Studies such as Melo et al. (2020) analyzed users' perceptions of the SIPAC warehouse module at the Federal Institute of Alagoas (IFAL), using the characteristics of product quality and use of ISO/IEC 25010. The results were mostly satisfactory, with a positive highlight for nine of the thirteen characteristics evaluated. Similarly, Dos Santos et al. (2020) evaluated SIGAA at the Federal University of Recôncavo da Bahia (UFRB) from the perspective of the characteristics of "functional adequacy" and "usability" of the standard. The study concluded that the implementation of the system was conducted in a standardized way, meeting minimum quality requirements.

Expanding this panorama, other studies have also applied the norm in different contexts. **Andrade, Filho and Guedes (2017),** for example, analyzed the perceived quality of SIPAC at the Federal University of Paraíba (UFPB), focusing on user satisfaction and the functional adequacy of the system for administrative routines. On another front, **Ribeiro (2018)** investigated the quality in use of SIGAA at the Fluminense Federal University (UFF) from the perspective of students, highlighting effectiveness and satisfaction, but pointing out deficiencies in efficiency, related to the time to complete tasks.

The SIGRH was also analyzed. **Oliveira, de Medeiros, and Costa (2019)** evaluated the quality of use of the system at the Federal University of Campina Grande (UFCG), concluding that, although the system was considered effective, there were usability problems that impacted managers' satisfaction. Focusing on usability, **Silva, Costa, and Santos (2021)** applied ISO 25010 to evaluate SIGAA at the Federal Rural University of Pernambuco (UFRPE), identifying specific bottlenecks in the interaction of professors with the platform. Finally, **Souza and Carmo (2020)** carried out an evaluation of the SIPAC contract module at a Federal Institute, using the characteristics of ISO 25010 to measure the perception of quality by key users, revealing a high evaluation for the safety and reliability of the system.

However, other SIGAA evaluations, without necessarily using ISO, pointed out problems. Lopes et al. (2018) identified that the system was underutilized at the Federal University of Piauí (UFPI), with usability below expectations. Paz (2019) highlighted advances in the agility of processes, but also an overload of work for professionals due to the volume of demands and the short time for analysis.

5 METHODOLOGY

The present research is characterized as an exploratory case study, with a quantitative-qualitative approach, since the results involve both the analysis of numerical data and the interpretation of textual data (CHIZZOTTI, 2018; YIN, 2015). The study setting was the Federal Rural University of Rio de Janeiro (UFRRJ), Seropédica campus, and the research subjects were students, professors, technical-administrative staff and IT professionals from COTIC, all users of the systems in question.

The methodological process was conducted in sequential phases. Initially, a literature review was carried out in databases such as CAPES Journals and Google Scholar to support the research, using descriptors such as "systems quality assessment", "ISO 25010" and the names of the systems (SIGAA, SIPAC, SIGRH).

The second phase consisted of the construction of data collection instruments. Online questionnaires were prepared, using the Google Forms platform, a necessary adaptation due to the restrictions imposed by the COVID-19 pandemic. The questionnaires were structured based on the characteristics of the ISO/IEC 25010 standard. For users (students and servers), the focus was on the characteristics of **Product Quality** (functional adequacy, performance efficiency, usability, safety) and on the characteristic of **Quality Satisfaction in Use**. For COTIC professionals, the questionnaire was directed to more technical characteristics, such as **maintainability, portability, reliability and compatibility**. The closed questions used a five-point Likert scale (LIKERT, 1967).

The next step was the application of the questionnaires. The dissemination took place through social networks linked to the university, institutional emails and memos via SIPAC, seeking to reach a representative sample of each group of users.

Subsequently, the data were processed. For the quantitative data, descriptive statistical techniques were applied, such as the construction of frequency tables and graphs, using Microsoft Excel software. To verify the internal consistency of the questionnaires, Cronbach's alpha coefficient was calculated. Additionally, Pearson's correlation was used to analyze the relationship between the variables of the closed questions. All inferential statistical calculations were performed with the aid of the PSPP software (RICHARDSON, 2017). The formula for calculating the sample for finite populations was considered to define the ideal number of respondents, which would be 370 students and 384 civil servants, for a margin of error of 5% and a confidence level of 95%.

n=p^·q^·zα/22+(N−1)·e2N·p^·q^·zα/22

For the qualitative data, from the open questions, Bardin's (2014) content analysis technique was used, which involved the semantic coding of the answers and their subsequent categorization based on the characteristics of ISO/IEC 25010. Finally, the results were described, analyzed and discussed, crossing quantitative and qualitative information to formulate the conclusions of the study.

6 DESCRIPTION AND DISCUSSION OF RESULTS

The survey obtained 198 valid responses from students and 94 from civil servants. Although these numbers are below the ideal samples calculated (370 and 384, respectively), the internal consistency of the instruments was validated by Cronbach's alpha test, which resulted in 0.71 for the students' questionnaire (considered substantial) and 0.86 for the civil servants' questionnaire (considered excellent), conferring reliability to the data collected (VIEIRA, 2009). The analysis focused on the SIGAA system, as it was the only one with sufficient data from both groups.

6.1 STUDENTS' PERCEPTION

The profile of the responding students is composed mostly of students from the Administration course (17%), followed by Food Engineering (9%), Pharmacy (8%) and Information Systems (8%). Most (34%) were between the 3rd and 4th academic period. Notably, 72% had already had experience with other academic systems and 95% said they deal well with virtual environments in general.

Regarding **functional adequacy**, the perception was mostly positive. About 48% of the students agreed (partially or totally) that SIGAA has the appropriate functions for its activities. Likewise, 48% considered that the functions generate correct information. This suggests that, from a functional point of view, the system meets the basic needs of students.

However, the evaluation of **performance efficiency** was drastically negative. The question "At a time of many accesses to SIGAA, such as during the enrollment period, the system continues to work without errors" had a disagreement rate (total or partial) of 92%. Similarly, 88% disagreed that the response time is satisfactory in these periods. Pearson's correlation between these two questions was 0.711, a strong value, indicating that, for students, the occurrence of errors is directly associated with the slowness of the system during access peaks. Another strong correlation (0.633) was found between poor response time at peak periods and impaired response time after a failure.

The content analysis of the open questions reinforced these findings. The category with the highest recurrence of negative comments was "Performance Capacity", with mentions to server instability, maintenance and login time, especially during enrollment periods. In the "Functional Completeness" category, students miss features such as the issuance of online student cards and integration with the purchase of tickets for the university restaurant. In addition, there was widespread criticism of the system's interface and aesthetics, which was described as unintuitive and poorly organized.

6.2 PERCEPTION OF SERVERS

The group of civil servants was composed of 91% of higher education professors and 9% of technical-administrative staff. The majority (56%) have been working at the university for more than 9 years, with greater representation of the Institutes of Agronomy (23%) and Applied Social Sciences (22%). The predominant age group was between 31 and 50 years old (59%).

Like the students, the servers evaluated the **functional adequacy** of SIGAA positively. Approximately 48% agreed that the system has the appropriate functions, and 60% stated that the functions generate correct information. However, when asked if the system has *all* the functions they need, the disagreement rate rose to 38%, suggesting that while what exists works, there are gaps.

The perception of **performance efficiency** was also negative, although with a slightly lower intensity than that of the students. About 65% of the servers disagreed that the system works without errors during enrollment periods, and 52% disagreed that the response time is satisfactory at these times. The Pearson correlation between these two variables was 0.850, a very strong value, confirming the strong association between errors and slowness under high demand.

Content analysis revealed specific functional needs of the servers. In the "Functional Completeness" category, the lack of tools to generate reports on student performance, more options for calculating grades, and better modules for managing graduate and extension activities were cited. In the "Use of Resources" category, there were complaints about the limitations of the tools for creating questionnaires and evaluative activities, as well as internal communication problems in the system. The "Performance Capacity" was again the most criticized point, focusing on the instability of access and the need for a more modern interface adapted to the reality of UFRRJ.

6.3 COMPARISON AND DISCUSSION

The comparison between the two groups reveals common and distinct perceptions. Both agree that SIGAA is functionally adequate for routine tasks, but suffers from severe performance and stability issues during peak periods. The need for a reform in the graphical interface and in the organization of information is a consensus.

The main difference lies in the specific functional needs of each group. While students demand functionalities related to daily student life (card, university restaurant), servers require more robust tools for teaching-learning management (assessments, reports, communication). The negative perception of instability in enrollment periods is noticeably more pronounced among students, who are the users most directly impacted by the unavailability of the system in this critical process. The results corroborate the findings of other studies, such as Lopes et al. (2018), on lower-than-expected usability, and Paz (2019), on the overload generated by the system.

7 FINAL CONSIDERATIONS, PERSPECTIVES AND COMMENTS

This work sought to analyze the perception of quality of the SIGAA system at UFRRJ, using the ISO/IEC 25010 standard model. The results allowed us to draw a clear diagnosis: the system, although functionally robust, fails in crucial aspects of performance efficiency, reliability and usability, especially under high demand. The stability of the system and the quality of its graphical interface are the most critical points in the perception of students and servers.

It was identified that, although there is a general perception that some functions are missing, the main problem may not be the absence, but the poor organization and the difficulty of accessing existing functionalities. The differences in the specific needs of each user group highlight the importance of a customization process that actively listens to different stakeholders.

The main limitations of the study were the number of respondents, which was below ideal due to the difficulties imposed by the pandemic, and the impossibility of applying the questionnaires to the SIPAC and SIGRH systems, as well as obtaining a sufficient sample of COTIC. Such limitations prevented a broader analysis and comparison between the different systems and the vision of the developers.

As a perspective, the continuity of this research is fundamental. It is suggested that the questionnaires be reapplied at a more opportune time to reach the desired samples and

that the analysis be expanded to the SIPAC and SIGRH systems. The collection and analysis of the perception of COTIC professionals are crucial to cross the user's vision with the technical vision on the customization, maintenance and evolution of systems. This integrated approach will allow a deeper understanding of the challenges and opportunities for improving the quality of information systems at UFRRJ, strengthening the university's ability to apply the knowledge generated internally in favor of the community itself and society.

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