

Digital limitations in the use of a condominium management system: a case study in a condominium management company

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Abstract: Digital transformation altered economic, social, cultural, and political relations in the twenty-first century using mobile digital devices to manage different aspects of organizations. However, it may also lead to the digital exclusion of individuals due to different limitations. In this context, this study sought to analyze how digital limitations manifest in the usability and efficacy of a management application in the context of digital transformation. For such, we opted for constructing a single case study with a qualitative, descriptive, and cross-sectional approach, presenting Alfa Gestão Condominial as the object of study. To collect the data, we conducted semi-structured interviews, documentary analysis, and direct observation, and the analysis occurred from the pattern-matching technique based on three constituent elements of the study (CES). As main results, we identified that the digital limitations of the users of the condominium management application were manifested through social, material, cognitive-informational, and behavioral aspects, with it being possible to emphasize autonomous learning, resistance to adopt instant messaging in the usability of the application, and the preference for personal contact with the analyzed organization as the primary digital limitations in the researched context.

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*Limitações digitais na utilização de um sistema de gestão condominial:
estudo de caso em uma empresa de gestão condominial*

Resumo: A transformação digital alterou relações econômicas, sociais, culturais e políticas no século XXI por meio da utilização de dispositivos digitais móveis para gerenciar diferentes aspectos das organizações. Entretanto, também pode proporcionar a exclusão digital de indivíduos por conta de diferentes limitações. Neste contexto, este estudo buscou analisar como as limitações digitais se manifestam na usabilidade e eficácia de um aplicativo de gestão no contexto de transformação digital. Para tanto, optamos pela construção de um estudo de caso único, com abordagem qualitativa e descritiva e recorte transversal, apresentando como objeto de estudo a Alfa Gestão Condominial. Para coletar os dados, realizamos entrevistas semiestruturadas, análise documental e observação direta, e a análise ocorreu a partir da técnica de pattern matching nos baseando em três Elementos Constitutivos de Estudo (ECE). Como principais resultados, identificamos que as limitações digitais dos usuários do aplicativo de gestão condominial se manifestam por meio de aspectos sociais, materiais, cognitivo-informacional e comportamental, sendo possível enfatizar o aprendizado autônomo, a resistência na adoção de mensagens instantâneas na usabilidade do aplicativo e a preferência pelo contato pessoal com a organização analisada como principais limitações digitais no contexto pesquisado.

Palavras-chave: Limitações Digitais; Sistema de Informação Gerencial; Gestão Condominial; Estudo de Caso.

1 INTRODUCTION

In 2020, the Brazilian real estate sector had approximately 84 thousand registered companies and employed around 256 thousand people, making this sector responsible for generating revenue more than 18 billion reais in 2020, which highlights its importance in the national economic context (Silva, Albino and Caldeira, 2023).

One aspect of consideration is the connection between quality on the real estate market, leading the companies to direct special attention to training real estate agents, who represent their human capital at the forefront of the corporate image

(Santos e Tavares, 2020). But it's important consider that this human capital have their digital limitations.

In a context of digital transformation and high connectivity, the study of digital limitations has provided new research fronts studying difficulties related to the access, adherence, and effective use of information and communication technologies (ICTs) such as the Internet and mobile devices, among other tools (Hai; Van; Thi Tuyet, 2021; Pereira Junior; Schroeder; Dolci, 2019; Pereira Junior; Novello, 2021). Bellini, Giebelen, and Casali (2010), Pereira Junior, Schroeder, and Dolci (2019), Pereira Junior and Novello (2021), and Pereira Junior et al. (2021) highlighted that the limitations may generate the inclusion, exclusion, and digital inequality among individuals, communities, and organizations.

Through the depictions by Bellini, Giebelen, and Casali (2010) and Pereira Junior, Schroeder, and Dolci (2019), it is noticeable that digital limitations may be caused by social, economic, technological, cognitive, and behavioral factors emerging through different fronts, such as economic differences, lack or unavailability of resources (Internet or devices), cultural barriers, lack of digital skills, or lack of technological knowledge about the devices and systems made available. Moreover, Pereira Junior and Novello (2021) highlighted that the context of digital transformation modified the relationships of the twenty-first century concerning economic, social, cultural, and political elements due to the improvement in usability and efficacy provided by the use of mobile digital devices (Hai; Van; Thi Tuyet, 2021).

Hence, on the one hand, one may realize that digital solutions may provide efficiency, transparency, and optimization of processes in several factors, and the digital platforms of organizations allow the centralization and storage of data on the same platform, the control and management of finances, transparency, and monitoring of demands in real-time (Balena, 2019; Pereira Junior, 2019; Schroeder; Dolci, 2019). On the other hand, it is understood that overcoming these barriers is essential for the benefits that come from the solutions and digital transformation to be truly materialized.

In this scenario, we developed the following research question: how do digital limitations manifest in the usability and efficacy of a management application in the context of digital transformation? Given the problems presented, this work aimed to analyze how digital limitations manifest in the usability and effectiveness of a management application in the context of digital transformation.

With this problematization and objective in mind, studying the theory of digital limitations may generate contributions to the academic, practical, and social spheres. For the academic field, the conduction of this study will elicit a discussion about the analysis of the theory of digital limitations in the context of condominium management applications, a fact not found in literature searches. For the management practice, this study is relevant due to the proposition of possible solutions to the digital limitations faced by collaborators or customers in the context of digital transformation. And, for the social environment, it is significant since the understanding of inequalities (social and digital) in the access and use of technology and the identification of barriers and solutions of this process are essential when thinking of an increasingly digitalized society, in which the full and egalitarian participation in the digital world brings many benefits.

2 DIGITAL LIMITATIONS: ORIGIN, CONCEPTS, AND APPROACHES

Theories of digital limitations emerged in the twentieth century from research that understood this concept as a challenging and relevant topic initially faced with the context of globalization and the lack of full use of the potential of a piece of technology (Barras, 1986; Bellini; Giebelen; Casali, 2010; Pereira Junior; Schroeder; Dolci, 2019; Pereira Junior; Novello, 2021; Pereira Junior et al., 2021).

In this context, Barras (1986) understood that the potential of a technology may be influenced by the categories of opportunity, usability, and adaptability. The first category refers to the speed of adoption of the technology by users to carry out their activities. The second category covers the availability and quality of the software, providing or not the ease of use of the system. Lastly, the third category touches on the resistance of users concerning the implementation of new technologies when it

involves the adjustment of the execution of work processes through digital elements.

From this contextualization regarding the emergence of the theory of digital limitations, we glimpsed in our reading the prominence of two potential theories, with Van Dijk and Hacker (2003) and Bellini, Giebelen, and Casali (2010) guiding recent studies (Pereira Junior; Schroeder; Dolci, 2019; Pereira Junior; Novello, 2021; Pereira Junior et al., 2021) regarding the topic of digital limitation.

The research by Van Dijk and Hacker (2003) focused on user access to ICTs, which may be influenced by several factors, such as the availability of communication technologies and the unequal distribution of economic, social, and cultural resources. In addition, cultural, social, and political aspects also influence the understanding and interpretation of information and interfere with how individuals see the world (Van Dijk; Hacker, 2003). In this context, the access theory, proposed by Van Dijk and Hacker (2003), seeks to understand how individuals have access to information and how this access affects the understanding of the world from four dimensions, namely psychological access, material access, skills access, and use access (Table 1).

Table 1 - Characterization of the Types of Access

TYPES OF ACCESS	CHARACTERIZATION
Psychological Access	One's ability to enjoy the benefits of technology.
Material Access	Availability of physical access to the resources needed to use the technology.
Skills Access	One's ability regarding the competencies, knowledge, and skills necessary to use the technology effectively.
Use Access	One's ability to use the technology effectively.

Source: prepared by the authors (2023).

According to Van Dijk and Hacker (2003), as the problems of digital technology (psychological access and material access) are solved, they gradually migrate to skills access and use access, from which it becomes necessary to analyze ways of dealing with them and identify possible solutions.

Based on access theory, Bellini, Giebelen, and Casali (2010) proposed an approach to digital limitations based on three dimensions: access limitation, cognitive-informational limitation, and behavioral limitation. The access limitation concerns

the social and material difficulties of an individual when using ICTs. The cognitive-informational limitation touches on one's deficiencies relative to the digital skills necessary to use the technology effectively. Lastly, the behavioral limitation is related to the difficulty one encounters when applying their digital skills, even possessing them at a high level.

Combining theories of digital limitations (Van Dijk; Hacker, 2003; Bellini; Giebelen; Casali, 2010), it is possible to obtain a more comprehensive view and understanding of the limitations found in the digital environment, covering aspects related to access and technical skills as well as behavioral and cognitive aspects, in addition to addressing different characteristics of this phenomenon. The theories addressed up to this point may be viewed as complementary since they provide relevant perspectives that intertwine and strengthen each other, allowing the development of effective strategies to tackle the challenges encountered and promote broader digital inclusion.

In line with the theoretical aspects presented up to this point, Table 2 details, based on Bellini, Giebelen, and Casali (2010), the empirical findings concerning the access, cognitive-informational, and behavioral limitations in recent studies by Pereira Junior, Schroeder, and Dolci (2019), Pereira Junior and Novello (2021), and Pereira Junior et al. (2021), which provided for the scarce literature on digital limitations the subcategorization of the limitations discussed by Bellini, Giebelen, and Casali (2010) in different manifestations.

Table 2 - Empirical Evidence of the Categorization and Subcategorization of Digital Limitations

LIMITATIONS	FACTORS	MANIFESTATION OF THE LIMITATIONS	EMPIRICAL EVIDENCE
Access Limitation	Social	Integration	Limited knowledge of the tool; Difficulty in usability and lack of instinctivity with the application in some modules for those unfamiliar with the tool.
		Configuration	Dependence on the technical team to meet the necessary demands and support requests.
	Material	Unavailability	Lack of power or an Internet connection where the system is hosted, which may cause instability or unavailability of the tool.
		Connectivity	Lack of or weak Internet connection, causing connections to be insufficient to meet the needs

			of the tool.
		Software	Insufficient memory for installation or efficient use of the application; Devices (e.g., desktops, laptops, smartphones, tablets, computers) that are obsolete or lack the capability to install the software required to use the tool.
		Infrastructure	Problems with the infrastructure and adequate resources to use the application.
Cognitive- Informational Limitation	-	Capacity- Building	Offer of short capacity building in video and brochure format; Even with the provision of information, users may encounter difficulties using the specific features available in the tool.
	-	Practicality	The perception of intuitiveness and navigability in the application; The difficulty of some users unfamiliar with the digital environment and the application may lead to the need to use external tools, such as WhatsApp and email.
Behavioral Limitation	-	Forgetfulness	Forgetting to add a document/attachment in the application.
	-	Registration of Demands	Lack of appropriate descriptions and information within the application, which may lead to a lack of understanding by the other party of what is being requested or registered; Unpreparedness to fill in the necessary information and deal with the available options.
	-	Difficulties of Use	Users are used to and generally have a preference for in-person communication and service, considering the application as an obstacle; Preference of users for the use of social networks such as WhatsApp, as they find the communication more dynamic through this medium.

Source: prepared by the authors (2023).

Based on the theoretical discussions by Van Dijk and Hacker (2003) and Bellini, Giebelen, and Casali (2010) and analyzing the studies by Pereira Junior, Schroeder, and Dolci (2019), Pereira Junior and Novello (2021), and Pereira Junior et al. (2021), one may observe that the topic previously focused on the context of globalization changed its focus to the digital transformation experienced from the mid-2000s and more significantly so within the context of the COVID-19 pandemic (Hai; Van; Thi Tuyet, 2021). This suggests the need to analyze how digital limitations are manifested in the current context, and, from this reflection, we proceed to the third session of this research with the description of the methodological procedures adopted.

3 METHODOLOGICAL PROCEDURES

To answer the research question: "How do digital limitations manifest in the usability and efficacy of a management application in the context of digital transformation?" , a qualitative, descriptive research with a cross-sectional approach was developed (Creswell; Creswell, 2021). To operationalize the study, we opted for the single case study to analyze the phenomenon in question in a contemporary and real context of the organization (Stake, 1995).

The selected case was Alfa Gestão Condominial, a company from Rio Grande/RS, Brazil, with activities focused on condominium management through its in-house management application, presenting characteristics adhering to the proposed objective. It should be noted that the case was selected intentionally, not randomly, and for convenience (Eisenhardt, 1989). The selection of this single case is justified by the following aspects: (i) the organization bridged a gap in the real estate market of its host city; (ii) it manages several condominiums in its locality; and (iii) it developed its own management application, which presents a diversity of functionalities (Financial, Defaulters, Notices and Circular Letters, Reservations, Dependents, Documents, and Occurrences).

Data were collected through semi-structured interviews, a documentary survey, and direct observation (Alves-Mazzotti; Gewandsznaider, 2000; Godoi; Mattos, 2006; Jaccoud; Mayer, 2008). The interviews took place in person from September to October 2023, with the support of a semi-structured script. In total, there were nine interviews with managers and stakeholders (condominium administrators and residents) of the organization. The interviews were recorded with the prior authorization of the respondents for subsequent transcription and had an average duration of 20 minutes each. The documentary survey was carried out by analyzing reports and meeting minutes made available by the company and information available on its website. In turn, the direct observation took place with the help of a guiding script with the categories of analysis for the observation of objective data and subjective feelings, seeking an alignment with the purposes of the research, from October to November 2023, in formal environments (meetings between managers and operational team and customer service at the company

headquarters) and informal environments (via phone calls and WhatsApp) of Alfa Gestão Condominial.

The data analysis was based on the pattern-matching technique (Trochim, 1989). This approach is employed in the comparison of events, behaviors, and situations identified in the studied context with the theoretical basis presented by the research.

To assist the data analysis technique, we defined, based on Kerlinger (1979), categories for the operationalization of the analyses in the forms of constituent elements of the study (CES) to define concepts and operational elements (aimed to assign meaning to the concepts), in addition to theoretical constitutive (TC) and practical operational (PO) definitions, which guide empirical research (Table 3).

Table 3: Categories of analysis and their constituent and operational elements

CES	TC	PO
CES1. Access Limitation	Social and material difficulties of an individual when using ICTs	It may be perceived in the field through the lack of power or an Internet connection where the system is hosted, the difficulty in usability, and the lack of instinctivity of the application.
CES2. Cognitive-Informational Limitation	Deficiencies of the individual concerning the digital skills necessary for using the technology	It may be described from the offer of short capacity-building and the difficulty of users with the digital format.
CES3. Behavioral Limitation	Difficulty the individual encounters when applying their digital skills	It may be noticed through the user's forgetfulness to attach documents on digital platforms, their preference for the in-person modality, and their unpreparedness to use the platform.

Source: prepared by the authors (2023).

After finalizing the description of the methodological procedures, we proceed to the presentation and analysis of the results.

4 PRESENTATION AND ANALYSIS OF RESULTS

With the purpose of analyzing how digital limitations manifest in the usability and efficacy of a management application in the context of digital transformation, this session will be presented in three parts corresponding to the CES defined in Table 3.

4.1 Access limitation

We identified digital limitations related to access, grouped into two axes of analysis: one aimed at social factors and the other at material factors (Bellini; Giebelen; Casali, 2010). Within the scope of social factors, we highlight issues related to the experience of using the tool, as well as how the functionalities offered by the application satisfied the specific needs of the respondents. In the axis associated with material factors, questions arose related to the quality of the infrastructure, covering the speed and usability of the application.

In the context of social factors, considerations related to the experience of using the tool arose, covering the practice of users with the application, in addition to the detailed analysis of how its functionalities respond and specifically meet the needs of the respondents, understanding the efficacy and adequacy of these characteristics to the individual and collective requirements of each user. Regarding the experience when using the application, the nine respondents recounted positive experiences, considering the tool to be a facilitator in monitoring the condominium and conducting its dealings. The following account by R7 evidences this point:

The application is great; I think it allows access to all the things that contemplate the condominium in your home, and with it, you may have a view of everything that happens, objectively. It provides a clearer view of everything that needs to be monitored (R7).

On the one hand, concerning the functionalities provided by the application, it not only met the individual needs of the condominium members but also the demands of the condominiums. Respondents R2, R3, R5, and R8 used the tool to access bank tickets, monitor the provision of accounts, and view notices/circular letters related to the condominium. In turn, respondents R4 and R7 indicated that, in addition to these functions, they also used the application to reserve the ballroom, monitor delinquencies, and view paid accounts and the amounts available in reserve.

On the other hand, the accounts by respondents R1, R6, and R9 indicated that the lack of integration of the tool with instant messaging applications, such as WhatsApp, hindered the adherence of other residents. This occurred because the absence or delay in responses in the app, which is not as instantaneous as in

WhatsApp, and people often look for means that provide faster responses and contact. At this juncture, R6 stated the following:

The application has two sides of the coin: it greatly facilitates the monitoring of demands; the only problem is the lack of adherence on the part of the condominium members. I believe the downside is that the response is instant in the chatting application but takes longer in the application. In addition, I believe some features may be more complicated for those who do not have so much contact with the digital environment (R6).

From the data collected, digital limitations were also identified regarding the unavailability of the system, problems related to the Internet connection, issues associated with the devices, as well as considerations about the usability of the tool, which refer to the material factor highlighted by Bellini, Giebelen, and Casali (2010).

As for the perception of the use of the application on the device most frequently used by the respondents, we observed that eight of them exclusively used the application on their cell phones and had never experienced using it on another device. Only respondent R4 described that they used the application on their laptop: "[...] I have accessed the application through my laptop, but I think it is better and faster to use it through the smartphone".

Another relevant aspect regarding access limitation involved speed and usability (application or Internet connection). Among the accounts collected, we noticed that respondents R1, R2, R3, R4, R6, R8, and R9 recounted that they had never faced problems using the tool, considering both problems or interruptions to the Internet connection and the unavailability or crashing of the application system. In turn, respondent R7 mentioned that although they had had no difficulties using it, they once faced a problem due to their device being out-of-date, which was possible to solve by updating the device. However, R5 accounted that "The application has always worked; I have had no problems regarding use; it takes a while to load, but it works."

4.2 Cognitive-informational limitation

Cognitive-informational limitations include the skills required to use the application and the evaluation of the practicality and intuitiveness of the system

(Bellini; Giebelen; Casali, 2010). The analysis of these limitations will include an integration with reflections on the training or guidance provided to users during the process of learning to use the tool, as well as the exploration of the details on how users effectively acquired the necessary competencies to use the tool, providing insights into the practice of this use (Pereira Junior; Novello, 2021). This comprehensive focus will enable an in-depth understanding of the cognitive and informational barriers faced by users in the context of using the application.

Among such barriers, we observed in the training or guidance received to learn to use the tool and in the learning process itself that six respondents (R2, R3, R5, R6, R8, and R9) recounted that they received a link for the application together with the access data (login and password), leading to the learning and use of the device without external assistance. However, three respondents (R1, R4, and R7) shared that they learned to use the application following the instructions provided by the condominium advisors representatives of Alfa Gestão Condominial. The advisors explained the download process, the available functionalities, and the approaches to using each of the icons, as one may observe through the account by R7. The account of these instructions may be exemplified by the statement by respondent R7, who clarified that:

The guidance on how to use the tool I obtained from the condominium advisor. She helped me install and access it, and I always turn to her or the managing company if I have any questions, although it is easy to access.

Concerning the description of the usability of the application, all nine respondents stated that they found it very simple, intuitive, and easy to use. They pointed out that by reading the information in the icons, it is possible to understand and use all the application functionalities. Among the responses, two respondents (R4 and R9) brought interesting perspectives on the tool. One mentioned that the application had a clear, easy-to-view layout, avoiding visual pollution or confusion. The other pointed out that the application contributed to agility in necessary consultations in real-time, being especially useful during condominium meetings. This latter aspect is exemplified in the following account:

The application is very easy to use; it facilitates the speed of any necessary consultation, even in meetings. We had a meeting and needed to see how much we had in reserve, and, in the same minute, I opened the application

and was able to visualize and expose to the other condominium members the amounts we had available to be able to list the priorities and necessary maintenance.

After the analysis, it became evident that the condominium administrators (R1, R4, and R7) shared a common perspective, with them stating that they had received the necessary guidance to use the condominium management application. This contrasts with the experiences recounted by the other condominium members, who indicated learning to use the tool independently. The diversity in learning approaches highlights the adaptability in the process of assimilation of the tool, demonstrating that users chose varied methods according to their individual preferences and needs. In this context, in a visit of the principal researcher of this study to one of the condominiums managed by Alfa Gestão Imobiliária, the crucial role of the condominium administrators in the dissemination of the tool was observed, with it becoming evident that in many cases they were sought by the condominium members in search of help for using and adequately understanding the tool, so the administrators played a role of facilitators and sources of support when necessary.

4.3 Behavioral limitation

Behavioral limitations were analyzed considering their relationship with the effective use of the tool, which, in the case of Alfa Gestão Condominial, was the management application. In addition, we identified how the information necessary for the use was acquired by the users and whether the tool was used autonomously or required third-party assistance.

Thus, when asked about using the application to make reservations, request services, or register problems and complaints, three respondents (R1, R2, and R3) stated they used the platform to register such requests. Two participants (R4 and R7) mentioned that they chose not to use the application for these records, preferring the managing company's WhatsApp channel despite being aware of the functionalities available in the tool. In contrast, one respondent (R6) recounted that they had previously used the application to register demands but preferred at the time of writing to use the condominium group on WhatsApp, considering it more practical and agile, as one may observe in the following account:

At first, I used the tool for these requests, but I currently use the condominium group since I find it faster and because, like me, I believe everyone also accesses WhatsApp more often, which facilitates communication and sending information, messages, photos, and videos.

Regarding the effective use of the application, whether conducted autonomously or with the need for assistance from third parties, all nine respondents recounted that they used the tool independently. However, one of the respondents (R7) mentioned that, although they used the application on their own most of the time, they turned to the managing company when they faced specific problems or doubts. This approach is evidenced in the statement by R7: "I use it alone most of the time unless I have a problem, in which case I contact the managing company to try to solve it".

It was also made evident from the data collection that respondents R1, R2, and R3 were the only ones who had experience with the application and used it regularly, exploring all its functionalities. These condominium members not only used the platform to make reservations, register complaints, and report problems but also took advantage of other available functionalities, highlighting the relevance of the tool for different social strata.

In addition, an account by the principal researcher of this work during a visit to the headquarters of Alfa Gestão Imobiliária showed that some clients (condominium members) preferred dealing with issues related to financial matters in person. This behavior became more noticeable among older residents, who demonstrated distrust of technology to solve their problems. In this context, they sought in-person service to obtain more transparency and trust in the services provided, reflecting a behavioral digital limitation (Bellini; Giebelen; Casali, 2010; Pereira Junior; Schroeder; Dolci, 2019; Pereira Junior; Novello, 2021; Pereira Junior et al., 2021).

5 DISCUSSION OF RESULTS

We begin the discussions of our results by resuming the research question that guided the conduction of this study: "How do digital limitations manifest in the usability and efficacy of a management application in the context of digital transformation?". From it and based on the theoretical landmark compiled in the constituent elements of the study, we developed some reflections that encompass

the topic of digital limitations around access, cognitive-informational, and behavioral limitations.

The theoretical concepts outlined in CES1 identified that users, including the administrators of the studied condominiums, perceived the lack of integration with instant messaging applications as a limitation. This concern expressed by the respondents coincides with the previous analysis of Pereira Junior and Novello (2021), who also addressed the difficulty of integrating the application with instant messaging platforms in their work. The lack of adherence on the part of the condominium members due to this limitation represents an obstacle to an efficient and complete experience offered by the tool.

Still concerning CES1, the material factor of access limitations was related to the preference of users for mobile devices, which reflects a trend described by Pereira Junior and Novello (2021), who observed the growing dependence on smartphones for performing tasks on smaller screens. The accounts of the respondents about the exclusive use of mobile devices highlight the predominance of this trend, while the exceptions underscore the possible challenges of adapting to different devices.

Regarding CES2 (cognitive-informational limitations), the comparison of the researched theory with empirical practice indicated that such limitations refer to the deficiencies of individuals in digital skills necessary to make effective use of ICTs, and this may be associated with the necessary capacity-building to use the application efficiently, among which it is possible to highlight the skill to search, select, process, and apply the information made available by the tool (Bellini; Giebelen; Casali, 2010; Pereira Junior; Schroeder; Dolci, 2019; Pereira Junior; Novello, 2021).

The diversity in learning approaches mentioned in the context of the condominium management application highlights the adaptability in the process of assimilation of the tool, demonstrating that users chose varied methods according to their individual preferences and needs. This aspect may refer to a discussion about resilience on the part of Alfa Gestão Imobiliária, as well as the users of its application, bringing to light a category of a posteriori analysis for the digital limitations that

may result in studies on adaptation, learning, communication, and the ability to change (Leite; Cruz; D'ávila, 2023a; Leite et al., 2023b). Moreover, the importance of intuitive usability of the application, as highlighted in the interviews, is in line with the presented theory, underlining the relevance of intuitive interfaces in the context of autonomous learning (Bellini; Giebelen; Casali, 2010; Pereira Junior; Schroeder; Dolci, 2019; Pereira Junior; Novello, 2021; Pereira Junior et al., 2021).

Within the scope of behavioral limitations (CES3), it was possible to observe in our data and the work by Pereira Junior and Novello (2021) the tendency of users to use other means of communication, resisting the use of the management application. This inclination reveals a predilection for using social networks, which are considered more dynamic alternatives for interaction (Balena, 2019; Lima, 2019; Pereira Junior; Novello, 2021). However, we noticed in our analyses that this resistance to the adoption of the application contrasts with the experience of the respondents since they not only met the condominium management application but incorporated it regularly into their routines, providing a new trend that departs from what was perceived in previous research.

Thus, we conclude the discussions of our results and proceed to the presentation of our final considerations.

6 FINAL CONSIDERATIONS

This research aimed to analyze how digital limitations manifest in the usability and efficacy of a management application. To this end, we first conducted a review of the literature on digital limitations (Van Dijk; Hacker, 2003; Bellini; Giebelen; Casali, 2010; Pereira Junior; Schroeder; Dolci, 2019; Pereira Junior; Novello, 2021; Pereira Junior et al., 2021) and, subsequently, opted for the construction of a single case study (Stake, 1995), with a qualitative, descriptive, and cross-sectional approach (Creswell; Creswell, 2021), presenting Alfa Gestão Condominial as the object of study. To collect the necessary data to answer our research question, we conducted semi-structured interviews, documentary analysis, and direct observation (Alves-Mazzotti; Gewandszneider, 2000; Godoi; Mattos, 2006; Jaccoud; Mayer, 2008), and

the analysis was performed using the pattern-matching technique (Trochim, 1989) based on three CES, developed from the indications of Kerlinger (1979).

In summary, the research on the various forms of digital limitation has provided a comprehensive understanding of the challenges related to the access and use of ICTs. The conceptual model developed based on the literature on digital exclusion and inequality identified three fundamental digital limitations: access, cognitive-informational, and behavioral. These limitations, interdependent in many cases, require specific approaches from both external agents and individuals themselves to be overcome.

Thus, as the main results of this study, we highlight on the axis of access limitation that social and material factors were identified, highlighting the experience of use and satisfaction with the functionalities of the application. While some condominium members praised the efficacy of the tool, others pointed to the lack of integration with instant messaging applications as an obstacle. In the material aspect, issues related to the quality of the infrastructure, such as the speed and usability of the application, were recounted. On the second axis, cognitive-informational limitation, the skills required to use the application were analyzed, revealing that some users learned independently while others received guidance from the condominium advisors. The usability was generally praised as simple and intuitive. Finally, on the behavioral limitation axis, we observed that although many condominium members used the application autonomously, some preferred alternative channels, such as WhatsApp, for specific interactions, evidencing individual and behavioral preferences. In addition, the research highlighted that some older residents opted for in-person service due to distrust of technology, indicating a specific behavioral limitation among this group.

Given this, we indicate as a theoretical contribution of this research the analysis of the theory of digital limitations in the context of condominium management applications, a fact not found in searches in the literature. In addition, we list that this study enables advances in the field of administration research since, by establishing parallels with previous studies, this research expanded the existing knowledge about the acceptance and efficacy of these tools around the topic of

digital limitations. Furthermore, we stress that this study offers a substantial contribution to the literature on the use of condominium management applications by thoroughly analyzing the digital limitations in the aspects of access, social, material, cognitive-informational, and behavioral factors, a fact provided by the depth of analysis of the single case study.

As practical contributions, it is possible to evidence that the data collected, analyzed, and discussed may provide managers with insights regarding periodic training, highlighting the practical benefits of the application compared to other forms of communication, the integration of functionalities that promote social interaction, such as forums or internal chat rooms, and the synchronization of the application with instant messaging platforms, which may lead to faster responses and engagement to use the application. Also, it is relevant to underscore that, with the operationalization of this research, it is also possible to provide social contributions, such as the understanding of inequalities (social and digital) in the access and use of technology and the identification of the barriers of collaborators of the studied organization and its customers, as well as solutions for this process, enabling the full egalitarian participation of the stakeholders in the current digital context, which were identified and addressed in the discussions of this research.

As limitations, we highlight the single case study approach, which does not allow data generalization but the deepening of discussions in a specific context. It is also worth highlighting as a limitation of this study the lack of availability of the respondents due to their personal and professional schedules, as well as the monitoring of some biweekly meetings that took place in the condominiums, which could reduce possible situations and experiences as additional contributions to the data.

As a suggestion for future research, we indicate three potential axes: (i) conducting similar research with organizations from different fields of activity in which the presence of digital inequalities is evident; (ii) proposing and validating a model for conducting quantitative research, which may lead to the generalization of results related to this theme; and (iii) studying the relationship of the approach to digital limitations with the topic of organizational resilience (Frare et al., 2023; Lavarda;

Leite, 2022; Leite; Cruz; D'ávila, 2023a; Leite et al., 2023b), seeking to deepen the understanding of the phenomenon and evincing solutions to digital inequalities.

Studies addressing digital limitations remain relevant for academic and managerial environments, especially due to the context of digital transformation, which has become more evident in the last five years (Hai; Van; Thi Tuyet, 2021). This topic may still provide significant contributions since, despite the growing digitalization in personal and professional relationships, inequalities in access to information and expertise for the use of digital tools remain challenges for the community (Balena, 2019; Lima, 2019; Pereira Junior; Schroeder; Dolci, 2019).

REFERENCES

- ALVES-MAZZOTTI, A. J.; GEWANDSZNAJDER, F. O Planejamento de Pesquisas Qualitativas. In: ALVES-MAZZOTTI, A. J.; GEWANDSZNAJDER, F. (Orgs.). O método nas ciências naturais e sociais: pesquisa quantitativa e qualitativa. São Paulo: Pioneira Thomson, 2000.
- BALENA, V. M. Sistema web para gestão imobiliária. Orientador: Vinicius Pegorini. 2019. 70 f. TCC (Graduação) – Curso de Tecnologia em Análise e Desenvolvimento de Sistemas, Campus Pato Branco, Universidade Tecnológica Federal do Paraná, Pato Branco, 2019.
https://repositorio.utfpr.edu.br/jspui/bitstream/1/24608/5/PB_COADS_2019_1_04.pdf
- BARRAS, R. Towards a theory of innovation in services. *Research Policy*, v. 15, n. 4, p. 161-173, 1986. [https://doi.org/10.1016/0048-7333\(86\)90012-0](https://doi.org/10.1016/0048-7333(86)90012-0)
- BELLINI, C. G. P.; GIEBELEN, E.; CASALI, R. do R. B. Limitações digitais. *Informação & Sociedade: Estudos*, v. 20, n. 2, p. 25-35, 2010.
<https://periodicos.ufpb.br/ojs2/index.php/ies/article/view/4393>
- CRESWELL, J. W.; CRESWELL, J. David. Projeto de pesquisa: Métodos qualitativo, quantitativo e misto. Penso Editora, 2021.
- EISENHARDT, K. M. Building theories from case study research. *Academy of management review*, v. 14, n. 4, p. 532-550, 1989.
<https://doi.org/10.5465/amr.1989.4308385>
- FRARE, A. B.; LEITE, F. K.; CRUZ, A. P. C. D.; D'ÁVILA, L. C. Mecanismos de controle gerencial, imprevisibilidade ambiental e resiliência organizacional. *Revista Contabilidade & Finanças*, v. 34, e1677, 2023. <https://doi.org/10.1590/1808-057x20221677.pt>

GODOI, C. K.; MATTOS, P. L. C. L. Entrevista qualitativa: instrumento de pesquisa e evento dialógico. In: C. K. Godoi, R. Bandeira-de-Mello, & A. B. da Silva (Orgs.). Pesquisa qualitativa em estudos organizacionais: paradigmas, estratégias e métodos. São Paulo: Saraiva, 2006.

HAI, T. N.; VAN, Q. N.; THI TUYET, M. N. Digital transformation: Opportunities and challenges for leaders in the emerging countries in response to COVID-19 pandemic. *Emerging Science Journal*, v. 5, n. 1, p. 21-36, 2021. <https://doi.org/10.28991/esj-2021-SPER-03>

JACCOUD, M.; MAYER, R. A observação direta e a pesquisa qualitativa. In: J. Poupard, J.-P. Deslauriers, L.-H. Groulx, A. Laperrière, R. Mayer, & Á. Pires. A pesquisa qualitativa. Petrópolis: Vozes, 2008.

KERLINGER, F. N. Metodologia da pesquisa em ciências sociais: um tratamento conceitual. São Paulo: EPU/EDUSP, 1979.

LAVARDA, R. A. B.; LEITE, F. K. Open strategizing and organizational resilience considering the environmental uncertainty. *Revista Ibero-Americana de Estratégia*, v. 21, n. 2, 21447, 2022. <https://doi.org/10.5585/riae.v21i2.21447>

LEITE, F. K., CRUZ, A. P. C.; D'ÁVILA, L. C. Resiliência Organizacional e Capacidade Adaptativa: um Estudo em Empresas Familiares Gaúchas. *Revista Eletrônica Ciências da Administração e Turismo*, v. 11, n. 1, 2023a. <https://doi.org/10.35700/2448-0126.2023.v11.n1.537>

LEITE, F. K., CRUZ, A. P. C.; D'ÁVILA, L. C.; WALTER, S. A.; SILVA, F. M. D. Organizational resilience and adaptive capacity: a case study in a family business in Rio Grande do Sul. *Revista de Administração da UFSM*, v. 16, e6, 2023b. <https://doi.org/10.5902/1983465969787>

LIMA, M. das C. Startups no mercado imobiliário: uma análise das atuais plataformas de transações comerciais imobiliárias e suas decorrências. Orientadora: Helena Midori Kashiwagi. 2019. 70 f. TCC (Graduação) – Curso de Tecnologia em Gestão Imobiliária, Setor Litoral, Universidade Federal do Paraná, Matinhos, 2019. <https://hdl.handle.net/1884/68957>

PEREIRA JUNIOR, E. F. Z.; NOVELLO, T. P. Mapeamento das limitações digitais de professores durante o ensino remoto. *Debates em Educação*, v. 13, n. 31, p. 903-925, 2021. <https://doi.org/10.28998/2175-6600.2021v13n31p902-926>

PEREIRA JUNIOR, E. F. Z.; SCHROEDER, E. A.; DOLCI, D. B. Limitações digitais, causas e consequências na efetividade do uso do site trello no planejamento estratégico de uma secretaria de educação a distância de uma universidade federal. *EmRede - Revista de Educação a Distância*, v. 6, n. 1, p. 69-85, 2019. <https://doi.org/10.53628/emrede.v6i1.433>

SANTOS, M. A. A. P.; TAVARES, L. M. R. R. V. Treinamento e-learning: a gestão do conhecimento aplicada a uma empresa do setor imobiliário. *Revista Estação Científica*, v. 14, n. 1, p. 1-14, 2020.

<https://estacio.periodicoscientificos.com.br/index.php/estacaocientifica/article/view/2389>

SILVA, P. D. C.; ALBINO, A. A.; CALDEIRA, T. A. Marketing no Setor Imobiliário: considerações dos gestores acerca das diferentes formas de prestação de serviço. *LIBERTAS: Revista de Ciências Sociais Aplicadas*, v. 13, n. 2, 2023.

<https://periodicos.famig.edu.br/index.php/libertas/article/view/416>

STAKE, R. E. *The art of case study research*. London: Sage, 1995.

TROCHIM, W. M. K. Outcome pattern matching and program theory. *Evaluation and Program Planning*, v.12, n. 4, p. 355-366, 1989. [https://doi.org/10.1016/0149-7189\(89\)90052-9](https://doi.org/10.1016/0149-7189(89)90052-9)

VAN DIJK, J.; HACKER, K. The digital divide as a complex and dynamic phenomenon. *The information Society*, v. 19, n. 4, p. 315-326, 2003.

<https://doi.org/10.1080/01972240309487>