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REGULAR ARTICLE

Evaluating the engagement of micro and small businesses in the 'Brasil mais' program in the interior of São Paulo: comparative perspectives of local productivity agents and rural innovation

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TMCT: Conceptualization; Supervision; Funding acquisition; GAU: Data analysis; JAGFC: Conceptualization; Experimental data collection; Manuscript revision; AVSJ: Literature review; Data analysis; Manuscript revision.

Abstract

This study investigates the impact of technology and innovation on micro and small enterprises (MSEs) in São Paulo's interior, focusing on the "*ALI - Brasil Mais*" Program by SEBRAE, in partnership with the National Council for Scientific and Technological Development (CNPq) and the Ministry of Economy. The program supports MSEs by fostering productivity and innovation through the Local Innovation Agents (ALI) framework, emphasizing the critical link between technological investment and business growth. Adopting a mixed-methods approach, structured questionnaires were administered to ALI agents across four SEBRAE regional offices. Findings underscore the pivotal role of digital tools—such as social media, communication applications, and ERP software—in enhancing operational efficiency and sales performance. Productivity-focused agents identified social media as essential, whereas rural-focused agents prioritized communication apps. Results also reveal distinct motivations among MSEs: productivity-focused companies prioritize sales growth, while rural enterprises emphasize production improvements. The study further demonstrates the program's measurable impact on business outcomes, particularly in revenue growth, process optimization, and shifts in organizational culture. Overall, the "*ALI - Brasil Mais*" Program has effectively promoted sustainable development for MSEs, highlighting the strategic importance of customized technological support. This research underlines the program's role in strengthening MSE resilience and competitiveness.

Keywords

Innovation; Innovation Ecosystem; *Brasil Mais* Program; Local Innovation Agent; Micro and Small Enterprises.

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Introduction

In today's rapidly evolving business environment, technology and innovation are essential elements for driving growth and competitiveness, particularly for micro and small enterprises (MSEs). For these businesses, a direct relationship exists between revenue growth and investment in innovative practices, which supports their capacity to adapt to changing market conditions. As defined by the Oslo Manual, innovation encompasses the implementation of significantly improved products, processes, marketing methods, or organizational practices (OECD, 2005). MSEs, due to their agility and unique economic position, can leverage innovative practices for substantial impact, especially in Brazil, where they represent over 90% of national enterprises and contribute approximately 30% to the Gross Domestic Product (GDP) (ABDI, 2021).

Despite the critical role that MSEs play in Brazil's economy, these businesses face considerable obstacles when it comes to adopting innovation and technology practices essential for competitiveness and sustainability. Limited access to technological resources, financial constraints, and cultural resistance to change are some of the significant barriers, particularly in rural and productivity-focused sectors, where traditional practices are deeply entrenched. Furthermore, research highlights how lack of flexibility and limited power-related competencies may hinder MSEs' ability to swiftly adapt to market changes, thus limiting their

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competitive edge (Priya, Sivakumar, & Hemalatha, 2019). This research seeks to address these challenges by examining strategies that can enable MSEs to overcome such barriers to innovation.

The primary objective of this study is to evaluate the effectiveness of the "*ALI - Brasil Mais*" Program, an initiative developed by SEBRAE in collaboration with the National Council for Scientific and Technological Development (CNPq) and the Ministry of Economy. This program aims to increase MSE productivity and foster innovation by providing tailored technological support through the Local Innovation Agents (ALI) framework. Specifically, this research intends to assess how program interventions, particularly the integration of digital tools like social media, communication applications, and ERP software, impact operational efficiency and sales performance in MSEs across São Paulo's interior. In exploring these interventions, the study will distinguish between productivity-focused and rural-focused enterprises to better understand their distinct motivations and technological requirements.

The notable economic contribution of MSEs to Brazil, including generating around R$ 420 billion in annual revenue and contributing approximately R$ 35 billion monthly to the economy, justifies the need for tailored support programs aimed at improving their competitiveness and resilience (SEBRAE, 2022). MSEs' close collaboration and cohesive work environments foster innovation and a collaborative culture, which supports creativity in problem-solving and market responsiveness (Sahut & Peris-Ortiz, 2014). Given the significance of MSEs in sustaining local and national economic development, this study is crucial in evaluating the *ALI - Brasil Mais* Program as a tool to mitigate existing barriers to innovation adoption, thereby creating an enabling environment for sustainable business growth within the MSE sector.

Initially, a literature review discusses the role of technology and innovation in enhancing MSE development, with a particular focus on the challenges and opportunities for small businesses. Following this, the methodology section details the quantic-qualitative approach, including the structured questionnaires administered to ALI agents across four SEBRAE regional offices. The results section then presents key findings, highlighting the varied roles digital tools play in both rural and productivity-focused enterprises. Finally, the discussion examines the broader implications of the ALI - Brasil Mais Program for MSEs, particularly in terms of revenue growth, process improvements, and cultural shifts within organizations.

Materials and methods

To fulfill the objectives of this study, a quanti-quality, exploratory, and descriptive research approach was selected. The methodological design ensured a detailed exploration of Local Innovation Agents' (ALIs) experiences within the SEBRAE "*ALI - Brasil Mais*" Program, allowing for insights into the impact on micro and small enterprises (MSEs) and the specific challenges encountered in adopting innovative practices. The study's design prioritizes replicability, with a structured approach encompassing data collection, sampling, and ethical considerations.

Data were collected through an online questionnaire administered via Google Forms, structured to capture both qualitative and quantitative data. The questionnaire included a combination of open-ended and closed, multiple-choice questions, allowing for comprehensive exploration of ALIs' field experiences and perceptions. The questionnaire underwent a pre-test with three ALIs, enabling adjustments that enhanced its reliability and validity. Data collection occurred in August 2022, focusing on ALIs' experiences from the program's inception earlier in 2022 to the data collection period.

The study's sample consisted of 30 Local Innovation Agents (ALIs) working in four SEBRAE regional offices: Bauru, Baixada Santista, Vale do Ribeira, and Sudoeste Paulista. These locations were purposefully selected based on academic and professional access provided by Professor Tatiene, the academic advisor to the ALIs, which facilitated effective data collection. This region-based approach was replicated in the rural context, where ALI Guilherme de Andrade Ussuna contributed specific insights into challenges faced in rural areas.

Given the exploratory nature of this study, descriptive data analysis was conducted to outline the findings. This approach allowed for a straightforward representation of the innovation landscape as perceived by the Productivity and Rural Local Innovation Agents. Descriptive statistical models were used to analyze quantitative data, while thematic coding was applied to qualitative responses, enabling nuanced insights into the challenges and benefits of the SEBRAE program. Where relevant, internationally accepted SI units were applied.

This study adhered to established ethical research standards, prioritizing participant rights and data confidentiality. All ALIs participating in the study were informed about its objectives and the voluntary nature of their participation. Digital informed consent was obtained before participants completed the questionnaire, ensuring they understood the confidentiality and anonymity assurances. Collected data were securely stored, with strict respect for participant privacy and data integrity, reinforcing transparency and ethical responsibility throughout the research process.

Results and discussion

This section presents a detailed analysis of the results obtained from the Local Innovation Agents (ALIs) regarding the impact of the "*ALI - Brasil Mais*" Program on micro and small enterprises (MSEs) in both productivity-focused and rural sectors. The findings are organized to highlight the differences in technology adoption, motivation, operational resources, and program outcomes as perceived by ALIs.

A key finding from the responses was the considerable recognition of technology as an essential resource for SME operations, with 100% of ALIs highlighting its critical role. This consensus highlights the alignment between the objectives of the "*ALI - Brasil Mais*" Program and the technological needs of SMEs. The adoption of technology allows companies to remain competitive by increasing productivity and operational efficiency, and the program effectively supports SMEs in this area. By providing technological resources and training, the program meets the industry's demand for digital transformation, facilitating the adoption of digital tools in various operational contexts.

The ALI's responses indicate distinct preferences for operational resources based on sector needs. Among productivity-focused MSEs, 45% of agents reported that social media platforms are essential tools for promotion and engagement, followed by 20% who emphasized the importance of Enterprise Resource Planning (ERP) systems for streamlined operations, complied with Figure 1 (a). In contrast, 80% of rural agents highlighted communication applications as the primary technological resource, with an additional 20% prioritizing ERPs. This variation illustrates how the program allows each sector to adapt its technological tools according to specific operational requirements, complying with Figure 1 (b). The flexibility to utilize sector-appropriate technologies underscores the program's capacity to support diverse MSE profiles effectively.

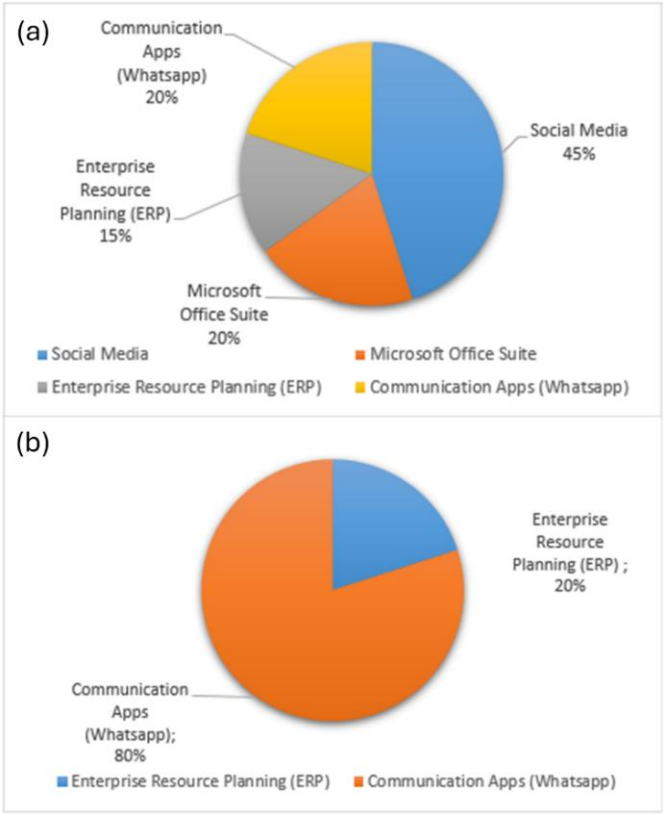

Figure 1. Fundamental resources for operations: Productivity (a) vs. Rural (b).

Different motivations emerged among agents, revealing that productivity-focused MSEs primarily seek sales growth, with 40% of ALIs highlighting increased customer acquisition as a significant motivating factor, as shown in Figure 2(a). On the other hand, rural-focused MSEs prioritize production improvements, as identified by 50% of ALIs, as shown in Figure 2(b). Furthermore, 25% of productivity-focused agents noted that process optimization was a motivating factor, as illustrated in Figure 2(a), while only 5% of rural agents shared this motivation, as shown in Figure 2(b). These findings suggest that the program successfully addresses industry-specific needs, with productivity-focused MSEs targeting market expansion and rural MSEs focusing on operational improvements. The alignment between the ALI Program offerings and the varying goals of MSEs in different sectors highlights the program's personalized approach to addressing the unique demands of each sector.

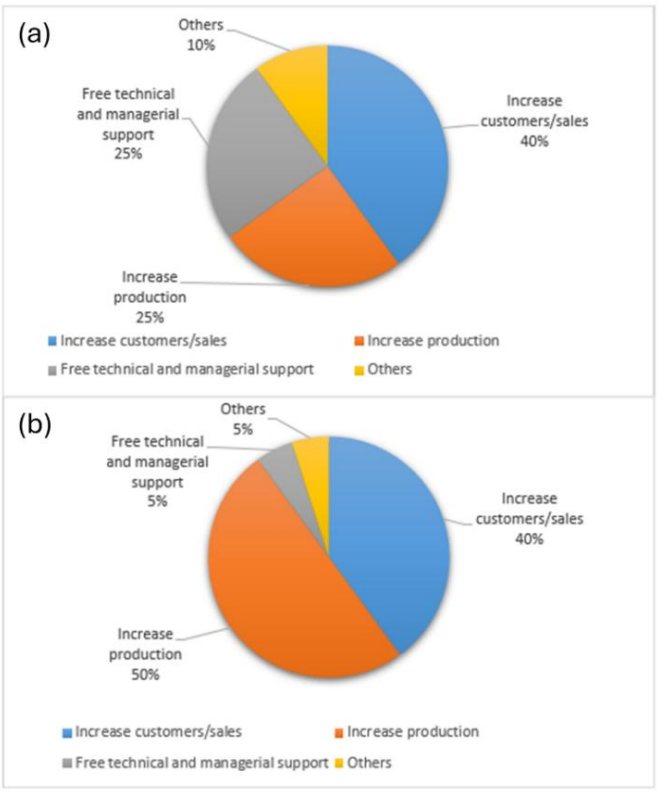

Figure 2. Motivations for Entrepreneur Participation in the ALI Program: Productivity (a) vs. Rural (b).

Analyzing the operational maturity of SMEs participating in the program, 50% of the productivity-focused businesses had been in operation for 4-6 years, and 35% had been established for 1-3 years, as shown in Figure 3(a). This suggests that these SMEs are either relatively new or have adapted to the challenges of recent economic conditions, such as the pandemic. In comparison, 80% of rural-focused SMEs have been in operation for more than 7 years, indicating a higher level of stability in this sector, as shown in Figure 3(b). The findings reflect a distinction in resilience, with rural SMEs generally being more established, while productivity-focused SMEs are often navigating growth phases and adapting to market changes.

The "*ALI - Brasil Mais"* Program has prompted substantial cultural and operational shifts within participating MSEs. According to the ALIs, one of the most notable outcomes was the adoption of an innovative-oriented mindset, with a significant portion of MSEs embracing changes that align with modern business practices. This cultural shift was evidenced in both productivity-focused and rural MSEs, where 55% of agents reported noticeable improvements in openness to change and flexibility in adopting new methods and technologies. This cultural adaptation is essential as it positions MSEs to better handle market fluctuations and adopt proactive strategies for sustained growth.

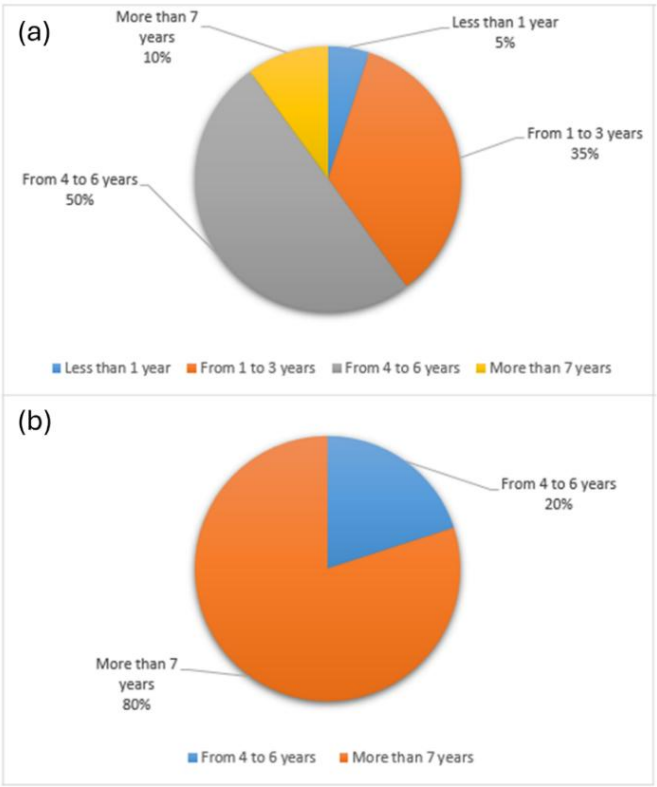

Figure 3. Average Market Operation Time of the Served Companies: Productivity (a) vs. Rural (b).

For productivity-focused MSEs, the cultural impact of the program was often reflected in their increased focus on data-driven decision-making and strategic planning. By adopting tools such as Enterprise Resource Planning (ERP) systems and digital communication platforms, these businesses reported higher levels of operational control and efficiency. Many ALIs observed that MSEs became more structured in their approaches to customer engagement and internal processes, allowing them to respond more effectively to market demands.

Rural-focused MSEs, while initially slower to adapt, showed significant progress in integrating technology into their operations. ALIs noted that rural MSEs gradually embraced communication applications and production-monitoring tools, leading to improvements in workflow coordination and output consistency. The shift in cultural mindset among rural enterprises represents a move away from traditional methods and an openness to innovation, which is expected to strengthen their resilience and adaptability within the agricultural sector.

Process efficiency was another area where the program made a significant impact. For productivity-focused MSEs, improved process control allowed for more streamlined operations, with 55% of ALIs reporting that these businesses had reduced operational bottlenecks and minimized resource waste, as Table 1. The application of digital tools facilitated workflow integration and provided real-time data that enabled businesses to adjust as needed. This improvement in process efficiency has direct implications for cost savings and operational sustainability.

In rural MSEs, the focus on process efficiency was particularly valuable for improving production reliability. According to 60% of ALIs, these businesses saw a boost in production consistency, as the integration of monitoring technologies allowed them to better control and manage agricultural outputs, as Table 1. The adoption of process improvements also encouraged these companies to formalize procedures that previously relied on informal or traditional practices. By adopting standardized processes, rural MSEs have strengthened their operational foundations, allowing for stable growth and easier scalability in response to demand fluctuations. The changes induced by the "*ALI - Brasil Mais*" Program extend beyond immediate impacts, with several ALIs indicating that the program has laid a strong foundation for sustainable growth within MSEs. According to 65% of agents, the adoption of innovation-oriented practices and process optimization has fostered a cultural shift that is likely to persist in the long term, as Table 1. This shift toward a culture of continuous improvement positions MSEs to remain resilient and competitive, even in the face of future market challenges.

Table 1. Key Impacts Perceived After the Completion of the Cycles.

Impacts	Productivity	Rural
Increase in sales	65%	-
Cultural Change	60%	55%
Process control	55%	55%
Increase Production	-	60%

One of the key aspects of this sustainability is the program's role in establishing standardized practices within MSEs. For productivity-focused businesses, the program has encouraged the formalization of workflows and the use of digital tools for monitoring and management. This standardization reduces dependency on individual roles and supports a more scalable structure, facilitating growth without compromising operational quality. ALIs observed that businesses are now better equipped to handle market expansions and operational changes, as they have embraced a foundation of structured, repeatable processes.

In rural-focused MSEs, sustainability is reinforced through the gradual adoption of technology and process formalization, which together improve operational stability. ALIs noted that while these businesses initially relied heavily on informal practices, the program has encouraged a transition to more formalized workflows, particularly in production monitoring and resource management. This formalization not only increases operational consistency but also opens opportunities for rural MSEs to integrate with broader supply chains, providing a pathway to growth and enhanced market presence.

The program's adaptability to different MSE profiles, whether productivity, or rural-focused, has been one of its core strengths. ALIs highlighted that the program's flexible approach, which tailor's resources and support based on the unique needs of each sector, has maximized its relevance and effectiveness. For productivity-focused MSEs, the program's emphasis on customer engagement tools, data-driven decision-making, and process optimization has provided a framework suited to their competitive market demands.

For rural MSEs, the gradual introduction of technology and support in building infrastructure has been key to the program's success. ALIs noted that this phased approach prevented the disruption of traditional workflows, allowing rural businesses to adopt innovations at a manageable pace.

Looking forward, the program could further enhance its impact by introducing advanced technologies tailored specifically to agricultural processes, such as soil monitoring and crop management systems. Expanding the scope to include these tools could empower rural MSEs to achieve even greater productivity and efficiency gains, contributing to broader economic resilience in rural areas.

Despite the positive impacts observed, the ALIs also highlighted specific challenges encountered by MSEs during the program, particularly related to the initial resistance to adopting new technologies and the limited resources available for full implementation. For productivity-focused MSEs, the primary challenge was integrating advanced digital tools without disrupting ongoing operations. Many of these businesses operate with lean teams, making it difficult to allocate time and personnel for extensive technology training. To address this, ALIs recommend that future program iterations include targeted support for technology onboarding, perhaps through step-by-step training modules or dedicated support personnel to assist with integration.

Rural-focused MSEs faced additional challenges due to infrastructure limitations and logistical barriers, which often hindered the effective implementation of new systems. Rural ALIs noted that internet connectivity and access to reliable power sources are persistent issues that can limit the adoption of digital solutions in agricultural settings. To improve program effectiveness in rural areas, ALIs suggest expanding infrastructure support, such as partnerships with local government or private sectors to enhance connectivity and power access. By addressing these foundational needs, rural MSEs could more easily adopt and benefit from the innovations introduced through the program.

The overall impact of the "*ALI - Brasil Mais*" Program has been both significant and transformative for participating MSEs. By fostering a culture of innovation, improving process efficiency, and enhancing technological integration, the program has enabled MSEs to become more competitive and adaptable to market changes. The program's tailored approach has proven effective in supporting both productivity- and rural-focused MSEs, underscoring its versatility and potential for broader application.

Looking ahead, the *"ALI - Brasil Mais"* Program holds substantial potential for expansion and refinement. Future program phases could focus on introducing industry-specific technologies that further address the unique needs of each sector. Additionally, a stronger emphasis on building foundational infrastructure in rural areas would allow the program to maximize its reach and impact. Through these targeted enhancements, the program could not only elevate the performance of MSEs in diverse sectors but also contribute to long-term economic resilience across Brazil.

Conclusions

This study demonstrated the substantial impact of the "*ALI - Brasil Mais"* Program on micro and small enterprises (MSEs) in both productivity and rural sectors, highlighting how innovation and the use of specific technologies can transform the competitiveness and sustainability of these businesses. The results indicated that by supporting these MSEs in implementing innovative practices and adapting to market changes, the program contributes significantly to regional and national economic development.

For productivity-focused MSEs, the program proved particularly effective in promoting sales growth and fostering a culture of innovation within organizations. Local Innovation Agents (ALIs) identified that the adoption of digital tools and training offered by the program boosted revenue growth and improved internal process control, allowing these businesses to operate more efficiently and competitively. The focus on technology as a strategic resource facilitated MSEs' entry into the digital market and their integration into broader value chains.

In the rural sector, the program's benefits centered on improving productive capacity and gradually adopting technologies adapted to the rural context, such as communication applications and production monitoring tools. Although rural businesses initially faced barriers in adopting new technological practices, the program's gradual approach enabled them to integrate these innovations sustainably. This transition process is particularly relevant in the agricultural sector, where introducing new technologies requires specific adaptations to align with traditional practices and the operating environment.

Data analysis also highlighted that the program promotes cultural adaptation within MSEs, encouraging an innovation-oriented mindset and a willingness to embrace operational changes. This cultural aspect is essential for long-term resilience, as it creates an environment where innovation becomes central to business strategies. By adopting a culture that values innovation, MSEs become more capable of responding to crises and market shifts, strengthening their competitive position in a volatile economic landscape.

The benefits observed go beyond operational improvements and reflect a structural transformation impacting how MSEs position themselves in their respective sectors. For productivity-focused businesses, process standardization and the use of digital platforms for control and monitoring offer a path to sustainable expansion, allowing these companies to scale their operations without compromising quality or efficiency. This formalization of processes represents a significant advancement for MSEs, which traditionally face challenges in maintaining operational consistency due to reliance on informal practices.

In the rural sector, transitioning to more formalized practices and integrating technology are essential steps to consolidate stability and reliability in agricultural production. Using communication and monitoring applications allows better team coordination and improved control over production outcomes. This way, rural MSEs can more efficiently meet market demands, integrating into larger supply chains and strengthening their position in the agribusiness sector.

However, the program still faces specific challenges to maximize its impact. In productivity-focused MSEs, the integration of digital tools may be hampered by a lack of human resources trained to handle more advanced technologies. Allocating time and personnel for training and adaptation may be limited in companies with lean teams, making the full implementation of innovations difficult. This scenario indicates the need for practical and phased training

modules, allowing a gradual incorporation of new tools without disrupting daily operations.

For rural MSEs, challenges are mainly related to infrastructure, such as internet connectivity and reliable access to electricity, factors that limit the adoption of digital solutions in remote areas. Expanding the program to include partnerships with government agencies and private companies could help overcome these barriers, creating a structural foundation that facilitates rural MSEs' insertion into a more connected and technological economy.

In terms of sustainability and long-term impact, the cultural shift observed within MSEs suggests that the "*ALI - Brasil Mais"* Program promotes a more resilient and adaptable business environment. Implementing innovative practices and process formalization ensures that these companies are prepared to face future crises and respond proactively to market demands. This focus on innovation not only improves MSE competitiveness but also contributes to regional economic resilience by strengthening the business foundations within the communities where these companies operate.

To enhance the program's positive impact, we recommend introducing more specific technologies for the sectors served, such as soil monitoring and crop management systems for rural MSEs, as well as analytical tools for sales optimization and inventory control for productivity-focused companies. These technologies would help businesses maximize productivity and efficiency, contributing to sustainable growth and integrating MSEs into an ever-evolving market.

Finally, this study points to some limitations that should be considered for future research. The sample, limited to specific regional offices, may restrict the generalizability of the results to other regions. Additional studies are recommended to explore the program's impact in different regional and sectoral contexts, as well as long-term evaluations to analyze the continuity of the cultural and operational benefits introduced by the *ALI - Brasil Mais* program.

In summary, the *"ALI - Brasil Mais"* Program stands out as a crucial initiative for strengthening micro and small businesses in Brazil, promoting innovation, competitiveness, and resilience. The observed results demonstrate that the program has the potential to positively influence economic development across various regions and sectors, creating an environment where MSEs can thrive and contribute significantly to the country's economic growth and stability. By continuing to invest in the improvement and expansion of this program, SEBRAE and its partners can consolidate a legacy of innovation and sustainability for Brazilian MSEs.

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