

Innovation and management of fish farming enterprises in the western mesoregion of Maranhão, Brazil

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Abstract:

In Brazil, fish farming has been growing in recent years, with a highlight in production and innovation in the sector. The objective was to evaluate the innovation and management of rural enterprises in the fish farming sector in the municipalities of Buriticupu and Bom Jesus das Selvas, in order to generate information that can serve as a basis for implementing actions, both in the public and private sectors, for the development of the activity and generation of income and employment. The study was conducted over a period of eight months (September 2022 to March 2023), with six fish farmers from the municipalities of Buriticupu and Bom Jesus das Selvas, located in the western region of the state of Maranhão. Ten face-to-face meetings were held, eight individual and two collective. In terms of management control, it was observed that in the initial evaluation, the enterprises scored 1.67, and in the final evaluation, 2.33. In the final management control assessment, a score of 2.33 was obtained, indicating a 39.5% increase rate after the actions taken. Regarding the improvement of the production process, it was observed that initially the score was 2.26, which implies that the producers did not prioritize the effectiveness of the processes and activities to be developed, leading to inefficiency in working time and waste of raw materials. The fish farming enterprises showed improvements in management control and production processes. The actions and tools used in this study showed good applicability on the properties, promoting such improvements and advancements, albeit small ones.

Keywords: Rural extension, administration, diagnosis, family farming.

Inovação e gerenciamento de empreendimentos de piscicultura na mesorregião oeste do Maranhão, Brasil

Resumo:

No Brasil, a piscicultura vem crescendo nos últimos anos, com destaque na produção e inovação do setor. O objetivo foi avaliar a inovação e o gerenciamento de empreendimentos rurais do ramo da piscicultura nos municípios de Buriticupu e Bom Jesus das Selvas, a fim de gerar informações que possam servir de base para implementação de ações, tanto dos setores público, como o privado, para

o desenvolvimento da atividade e geração de renda e emprego. O estudo foi realizado durante um período de oito meses (setembro/2022 a março/2023), com seis piscicultores dos municípios de Buriticupu e Bom Jesus das Selvas, localizados no oeste do estado do Maranhão. Foram realizados dez encontros presenciais, sendo oito individuais e dois coletivos. No controle gerencial, observa-se que na avaliação inicial, os empreendimentos apresentaram nota 1,67 e na avaliação final, nota 2,33. Na avaliação final do controle gerencial foi obtido nota 2,33, indicando uma taxa de aumento de 39,5% após as ações realizadas. A respeito da melhoria do processo produtivo, observa-se que inicialmente a nota foi de 2,26, o que implica dizer que os produtores não priorizavam a eficácia dos processos e atividades a serem desenvolvidas, ocasionando ineficiência no tempo de trabalho e desperdício de matéria prima. Os empreendimentos de piscicultura apresentaram melhorias em relação ao controle gerencial e aos processos produtivos. As ações e ferramentas utilizadas no presente estudo apresentaram boa aplicabilidade nas propriedades, promovendo tais melhorias e avanços, ainda que pequenos.

Palavras-chave: Extensão rural, administração, diagnóstico, agricultura familiar.

Innovación y gestión de emprendimientos de piscicultura en la mesorregión oeste de Maranhão, Brasil

Resumen:

En Brasil, la piscicultura ha estado creciendo en los últimos años, con un énfasis en la producción e innovación del sector. El objetivo fue evaluar la innovación y la gestión de empresas rurales en el sector de la piscicultura en los municipios de Buriticupu y Bom Jesus das Selvas, con el fin de generar información que pueda servir como base para la implementación de acciones, tanto del sector público como privado, para el desarrollo de la actividad y la generación de ingresos y empleo. El estudio se realizó durante un período de ocho meses (septiembre de 2022 a marzo de 2023), con seis piscicultores de los municipios de Buriticupu y Bom Jesus das Selvas, ubicados en el oeste del estado de Maranhão. Se llevaron a cabo diez reuniones presenciales, ocho individuales y dos colectivas. En cuanto al control de gestión, se observa que en la evaluación inicial, las empresas obtuvieron una calificación de 1,67 y en la evaluación final, una calificación de 2,33. En la evaluación final del control de gestión se obtuvo una calificación de 2,33, lo que indica una tasa de aumento del 39,5% después de las acciones realizadas. Respecto a la mejora del proceso productivo, se observa que inicialmente la calificación fue de 2,26, lo que implica que los productores no priorizaban la eficacia de los procesos y actividades a desarrollar, lo que llevaba a la ineficiencia en el tiempo de trabajo y el desperdicio de materia prima. Las empresas de piscicultura mostraron mejoras en cuanto al control de gestión y a los procesos productivos. Las acciones y herramientas utilizadas en este estudio mostraron buena aplicabilidad en las propiedades, promoviendo dichas mejoras y avances, aunque sean pequeños.

Palabras clave: Extensión rural, administración, diagnóstico, agricultura familiar.

INTRODUCTION

In Brazil, fish farming has been growing in recent years, with a focus on production and innovation in the sector. This growth is closely tied to the demand of the domestic market, as consumption has exceeded 500,000 tons (IBGE, 2021). Therefore, it is necessary to understand the peculiarities of fish trading in the state of Maranhão to enhance the competitive power of fishery products in the market. However, there is a lack of information

and data in the literature regarding producers in the region under study. According to Sonoda *et al.* (2012), understanding the demand for fish among consumers and how it relates to other types of proteins and foods is fundamental to ensure an increase in fish consumption.

By 2030, 60% of the fish consumed will come from fish farming, surpassing fishing by 54% (FAO, 2016). Regarding Tilapia production, Brazil ranks 4th globally, behind only China, Indonesia, and Egypt, and ahead of the Philippines and Thailand, which also have significant participation in the global scenario. Among the states of Brazil, Maranhão is among the largest producers of farmed fish in the country, with a significant 8% increase in production compared to 2021, reaching 50,300 tons in 2022 (Tilapia 5,200, Native fish 39,100, and other species 6,000 tons). Thus, according to the Brazilian Aquaculture Association, the state ranks sixth among the largest national producers and second in native fish production (PEIXE BR, 2023).

As a result of this significant growth, fish farming has provided income opportunities for families living in rural areas. This is due to the favorable climate, water availability, and the vast territorial expanse of the state of Maranhão. Therefore, this sector makes an important contribution to job creation and income generation in the state (BARROS; MARTINS; SOUZA, 2018; BARBOSA *et al.*, 2020). With the aim of aiding competitiveness and effective business management in the sector, and consequently promoting the expansion of fish farming in the region, this study aimed to evaluate innovation and the management of rural enterprises in the fish farming sector in the municipalities of Buriticupu and Bom Jesus das Selvas. The goal is to generate information that can serve as a basis for the implementation of actions by both the public and private sectors to foster the development of the activity and generate income and employment.

METHODOLOGY

The study was conducted over a period of eight months (September 2022 to March 2023), involving six fish farmers from the municipalities of Buriticupu and Bom Jesus das Selvas, located in the western region of the state of Maranhão. Ten face-to-face meetings

were held, comprising eight individual sessions and two collective sessions, at no cost to the fish farmers. However, the focus of this study was directed towards managerial control and improvement of the production process on these properties. Furthermore, the development of this methodology had special support from the Center for Advanced Morphophysiological Studies at UEMASUL, which works in investigations with fish.

During the first individual meeting, fish farmers were sensitized to participate in the project through the signing of an adhesion agreement and the application of the Radar Chart. This involved a questionnaire with twenty-one evaluative questions related to the rural property and categorized into five dimensions: managerial control, improvement of the production process, marketing and sales, cost reduction, and new products.

In the second individual meeting, the feedback from the Radar Chart was delivered to the producer. Based on the chart, notes were made on each aspect, highlighting the positive and negative points of the rural properties. At this stage, suggestions and alternatives were outlined for the construction of the Improvement Plan. Additionally, initial performance indicators of the rural properties were collected to identify opportunities. During the third individual meeting, the improvement plan was developed in collaboration with the rural producers. Prioritized actions and activities were identified to quickly transform rural enterprises into more productive, profitable, and organized businesses.

The fourth collective meeting, focusing on rural entrepreneurship, aimed to initiate the process of collective learning among rural producers and foster networking. In the fifth individual meeting, actions resulting from the collective meeting were strengthened, emphasizing the importance of managerial controls for the development of rural enterprises. Additionally, the consistency of the proposed actions for better service and execution of the improvement plan was evaluated.

In the sixth individual meeting, the effects of the proposed actions were monitored. The Canvas program was introduced as an auxiliary tool for developing the business model, useful for analyzing and organizing business elements and understanding how they interrelate. The seventh meeting, also individual in nature, focused on monitoring and evaluating the proposed actions for each previously examined dimension. Performance

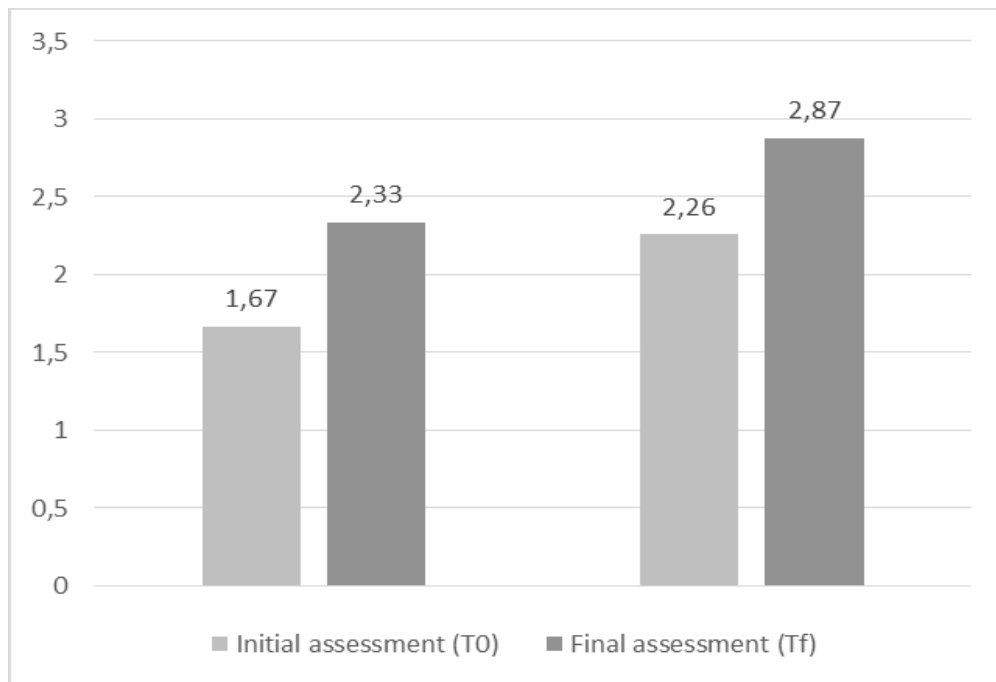
indicators were collected, and the Ishikawa Diagram was used as an auxiliary tool to help rural producers reflect on the causes and effects of specific problems in rural enterprises, prioritizing means and measures to prevent them.

In the eighth individual meeting, the set of proposed actions and their effects on rural enterprises were evaluated. Considering the results achieved with the improvement plan, a critical analysis of the actions carried out in the scope of managerial control and production process improvements was conducted.

RESULTS AND DISCUSSION

The fish farming activity in the evaluated municipalities serves as both a commercial subsistence activity, providing income for families whose livelihood depends on fishing and selling fish, and as a culturally significant practice passed down through generations in the region. According to Viana *et al.* (2022), Maranhão stands out among the largest fish producers in the Northeast region of Brazil, even supplying neighboring states such as Tocantins. Among the most produced fish species is the tambaqui (*Colossoma macropomum*), known for its high adaptability to various environments. All the meetings and actions carried out were crucial in achieving improvements and the success of the evaluated rural businesses (Figure 1). As stated by Zanin *et al.* (2014), the success of a rural enterprise not only relies on increasing productivity through modern techniques but also on knowing how to manage the property to achieve the desired results and continue thriving with significant profits.

Figure 1. Average grades obtained for each dimension of the radar chart of innovation in the initial assessments (T0) and final (Tf) in 6 fish farming properties.



Source: Autor, 2024.

In managerial control, it is observed that in the initial assessment, the enterprises scored 1.67, and in the final assessment, they scored 2.33. Initially, the producers were lax regarding the knowledge of the operational costs of the company due to the absence of financial performance indicators necessary for rational and assertive decision-making. It is worth noting that some of the properties under study, despite having means of managerial control, did not use them effectively, which directly affected their revenue.

The generalist perspective of the main management processes (strategy, human resources, marketing, logistics, finance, production, information system) requires, for each reality, the proper contextualization and extension of concepts in order to formulate management models that assist in the decision-making process and managerial control (MAXIMIANO, 2005). In this study, it was possible to identify that fish farmers often use simple notes made in notebooks for managerial information, and they do not have the habit of separating personal expenses from those related to commercial activity, which hinders

decision-making, as personal resources are confused with those aimed at agricultural production.

In the final assessment of managerial control, a score of 2.33 was obtained, indicating a 39.5% increase after the actions taken. This increase was achieved due to the adoption of managerial control tools and actions, such as the use of Excel program for data tabulation, notebooks for recording important information, and alignment of action strategies and sharing of solutions and ideas that can improve the production process.

According to Soschinski *et al.* (2018), managerial control allows identifying the viability of investments and the time of return. Therefore, it is extremely important that entrepreneurs are motivated to develop managerial control for better management of their company, which can enhance the chances of success in decision-making by using information control practices (NASCIMENTO *et al.*, 2022).

Regarding the improvement of the production process, it is observed that initially, the score was 2.26, implying that producers did not prioritize the effectiveness of the processes and activities to be developed, resulting in inefficiency in working time and waste of raw materials. In this sense, producers did not act preventively to avoid problems and did not use mechanisms to motivate employees. In the final assessment, an advancement of around 27% in improvements in the production process can be observed. This advancement was mainly generated due to the participation of producers in training courses related to the activities carried out in the enterprise.

FINAL REMARKS

The fish farming enterprises showed improvements in managerial control and production processes. The actions and tools used in the present study demonstrated good applicability in the properties, promoting such improvements and advancements, albeit small ones. Additionally, through these actions, it was possible to identify new opportunities

in the market and make rural enterprises more competitive by strengthening businesses in their respective municipalities.

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