MULTIPLE CASE STUDIES IN DAIRY AGRIBUSINESS: LEAN THINKING AND VALUE CO-CREATION IMPLICATIONS[1]

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Abstract

This paper aims to identify the barriers and contributions of Lean in co-created agro-industrial services in the dairy production context. We conducted nine multiple-case studies to gather empirical data on Lean Thinking adoption in value co-creation within dairy production services. Based on the findings, seven barriers and eight contributions in dairy production were identified from the Lean Thinking adoption. Additionally, is possible to provide support to managers in decision-making and encourage the value co-creation among players to develop new agro-industrial services.
Keyword: Agro-industrial Services, Dairy Production, Value co-creation.

ESTUDO DE MÚLTIPLOS CASOS NO AGRONEGÓCIO LEITEIRO: IMPLICAÇÕES DO PENSAMENTO ENXUTO E DA COCRIAÇÃO DE VALOR

Resumo

Este artigo tem como objetivo identificar as barreiras e contribuições do Lean em serviços agroindustriais cocriados no contexto da produção leiteira. Conduzimos nove estudos de casos múltiplos para coletar dados empíricos sobre a adoção do pensamento enxuto na cocriação de valor nos serviços de produção de laticínios. A análise de conteúdo baseou-se em Bardin (2011). Com base nos achados, foram identificadas sete barreiras e oito contribuições na produção de laticínios a partir da adoção do pensamento enxuto. Os achados auxiliam na construção de estratégias de rastreabilidade leiteira, e eliminando desperdícios na cadeia produtiva de alimentos, é possível prover suporte aos gestores na tomada de decisões e estimular a cocriação de valor entre os atores para desenvolver novos serviços agroindustriais.
Palavra-chave: Serviços Agroindustriais. Produção Leiteira, Cocriação de valor.

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ESTUDIO DE CASOS MÚLTIPLES EN LA AGROINDUSTRIA LÁCTEA: IMPLICACIONES DEL PENSAMIENTO LEAN Y LA CO-CREACIÓN DE VALOR

Resumen

Este artículo tiene como objetivo identificar las barreras y contribuciones de Lean en los servicios agroindustriales co-creados en el contexto de la producción láctea. Llevamos a cabo nueve estudios de casos múltiples para recopilar datos empíricos sobre la adopción del pensamiento lean en la creación conjunta de valor en los servicios de producción lechera. El análisis de contenido se basó en Bardin (2011). Con base en los hallazgos, se identificaron siete barreras y ocho contribuciones en la producción lechera con base en la adopción del pensamiento lean. Los hallazgos ayudan en la construcción de estrategias de trazabilidad láctea, y al eliminar el desperdicio en el suministro de alimentos, es posible apoyar a los gerentes en la toma de decisiones y fomentar la co-creación de valor entre los actores para desarrollar nuevos servicios agroindustriales.

Keyword: Servicios Agroindustriales, Producción Láctea, Co-creación de Valor.

1. Introduction

According to Søndergaard (2023), agribusiness is one of the most important sources of wealth in Brazil. A triangle of this complex for the national economy can be measured by indicators of the magnitude of a Gross Domestic Product (GDP). Barnard et al. (2020) consider the agribusiness sector has great potential for growth in the coming years.

Lourenço and De Lima (2009) and Hakimi, Zahraee, and Modh (2018) suggest that despite the positive performance, the dairy sector faces limitations and challenges that endanger its competitiveness. The interaction among different areas or individuals, knowledge, good management practices, and technologies enables the development of joint solutions, where all parties gain advantages and benefits (LEE; OLSON; TRIMI, 2012; BONAMIGO; FRECH; LOPES, 2021).

In the value co-creation context, Vargo, Maglio, and Akaka (2008) suggest that useful and marketed products based on their exchange value give rise to individual experiences and perceptions that lead to value appropriation during their use - value in use. Then, the advantages of the business ecosystem approach for dairy production are linked to the innovation stimulation among the players and waste mitigation among them (FERENHOF et al, 2019).

Satolo et al. (2017) have pointed out the lack of scientific research and potential contribution from the application of Lean Thinking (LT) that can occur in the agro-industrial sector. According to Womack, Jones, and Roos (2007), LT is a philosophy

that aims to optimize processes to increase productivity by using fewer resources, less time, and less space.

According to Cuer, Bernardo and Scalco (2019), there are still significant gaps in the existing literature regarding the application of Lean philosophy in the agri-food chain, which could be explored to contribute significantly to food production worldwide in a more sustainable manner that promotes the health of the consumer and the environment. These gaps can be classified into three categories: conceptual, contextual, and methodological (KIMARO, KISAWIKE, AND RUOJA, 2021). Additionally, to Bonamigo et al. (2020), the challenge faced by producers in value co-creation is due to the fear of sharing information and resources, incompatibility between actors, and lack of experience in the value co-creation context.

According to Womack and Jones (1997), LT is a methodology for defining value, aligning production flow in the best sequence, and conducting these actions without interruption when requested by the customer, seeking to make them increasingly effective. The goal of LT is to achieve customer value with fewer resources, which can be accomplished even without using traditional Lean tools, making it a more strategic way of working and managing businesses (HINES; HOLWEG; RICH, 2004; NIELSEN; PEJSTRUP, 2018).

The adoption of the Lean philosophy in agribusiness services has been increasing in recent years and has shown positive results for producers. However, the literature is still in its early stages, considering that research on Lean in the agro-industrial sector (CUER, BERNARDO, AND SCALCO, 2019).

Collaboration improves competitiveness, promotes knowledge and techniques sharing, increases trust among actors, and shares risks. It also enables business innovation through the exchange of resources and knowledge among two or more actors (BITZERA AND BIJMAN, 2015; FRANKLIN AND OEHMKE, 2019).

In this context, the value co-creation concept can be mentioned, which is the outcome of the integration of resources such as people, technology, organizations, and information exchange (MAGLIO et al. 2009) among various actors including companies, customers, suppliers, employees, stakeholders, and other partners, resulting in value creation for all parties involved (VARGO; MAGLIO; AKAKA, 2008; PINHO et al. 2014).

Thus, Lean methodology enables the creation of value in the dairy supply chain (SHAMAH, 2013). Therefore, exploring new strategies among dairy actors, such as Lean, can enhance milk quality, create novel market opportunities, introduce new dairy products, and reach untapped markets (DENTONI; BITZER; PASCUCCI, 2016; CHALA et al., 2018). Further research is needed to investigate the benefits of value co-creation practices among agro-industrial actors and compare the findings to those of other sectors.

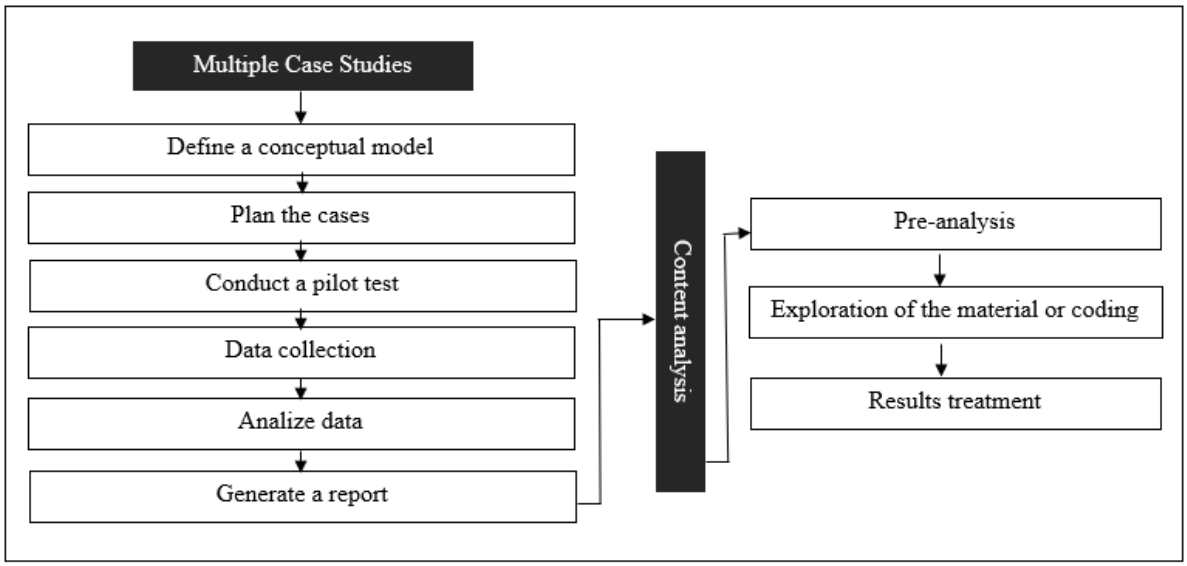
In light of the aforementioned, the objective of this research is to identify the barriers and benefits of implementing Lean in co-created agro-industrial services within the dairy production context. To achieve this goal, a multiple case study was conducted to gather empirical evidence regarding the adoption of Lean in the dairy agribusiness sector. Although this study focused on agro-industrial products, it can serve as a basis for agro-industrial services, since Rozenfeld et al. (2006, p. 538) define products as "Products and services developed or satisfy customer requirements and, at the same time, the strategic interests of the company."

Building on the literature reviewed earlier, several questions arise that are crucial for the multiple case study's developments. These include: *"What benefits can dairy producers gain from value co-creation?" "Is Lean Thinking a viable methodology to be adopted in the dairy industry?" "How has Lean Thinking facilitated value co-creation among dairy producers and other industries?" "What are the benefits and challenges that producers encounter when implementing Lean Thinking in their business?".*

2. Research Methodology

The objective of this study is to identify the barriers and contributions of Lean in co-created agro-industrial services in the dairy production sector. To achieve this aim, the authors conducted nine multiple-case studies using the strategy proposed by Bonamigo et al. (2020). The authors implemented a two-stage process, as illustrated in Figure 1.

Figure 1 – Methodology Steps



Source – The Authors

According to Yin (2014), case studies offer an empirical, context-based investigation in-depth. As such, this qualitative study method provides valuable insights into practical results that may not have been sufficiently explored in the literature (SIGGELKOW, 2007; YIN, 2014). For research with a less established theoretical foundation, developing, elaborating, and conducting empirical tests through a qualitative study is often the most appropriate approach (EDMONDSON, 1999; YAUCH; STEUDEL, 2003).

However, multiple case studies provide robust content (HERRIOTT; FIRESTONE, 1983) as they allow for comparisons among different cases (CHIESA et al. 2007; HALINEN; TÖRNROOS, 2005).

The multiple case studies conducted in this research revealed that all the barriers encountered by dairy producers are novel in a context where Lean Thinking in the dairy sector is relatively unexplored. According to Yin (2001), multiple case studies are more compelling, as they provide a thorough and comprehensive understanding of the object of study.

Eisenhardt (1989) suggests that the number of cases for multiple case studies should range between four and ten, and thus, we conducted nine case studies in this research. The study followed the research proposal by Cauchick-Miguel et al. (2010), which involves 1) Defining a theory or conceptual model, 2) Planning the cases, 3) Conducting a pilot test, 4) Collecting data, 5) Analyzing data, 6) generating a report.

2.1. Case selection and data collection

To provide a comprehensive understanding of Lean application in the dairy sector, this study examined nine cases of farms of varying sizes, from micro to large, that have implemented Lean Thinking for over a year. This approach aimed to showcase different perspectives and challenges faced by producers of varying business sizes, offering insights applicable to agro-industrial enterprises of all sizes. Additionally, some producers collaborated in value co-creation. The cases were sourced from a Lean-specialized organization database.

We conducted interviews with dairy farm owners who had implemented the Lean approach with support from a cooperative and specialized Lean philosophy consultant, as well as technicians who assisted in the application of this methodology on other farms. One of our case studies focused on a company that was facilitating the implementation of Lean practices on farms that supplied milk to the company as a raw material for their products. To protect the confidentiality of the respondents and companies, the real names of the organizations and employees were not disclosed, along with some sensitive data. Data was collected using a semi-structured questionnaire based on a review of relevant literature on the subject, supplemented in some instances by analysis of documents provided by the interviewees.

Two initial interviews were conducted with Lean and value co-creation experts in the agro-industrial services sector to fine-tune the data collection instrument. Subsequent incremental adjustments were made to the instrument. The purpose of the study was to investigate how B2B agribusiness service companies implement Lean principles and engage in value co-creation. The interview protocol was structured into six thematic blocks: (1) company and interviewee background, (2) Lean methodology, (3) cooperation, (4) value co-creation without Lean, (5) value co-creation, and (6) Lean in value co-creation.

From September to October 2022, we conducted a total of nine interviews (as shown in Table 1) using online meeting platforms. Each interview session had a duration of approximately 30 minutes, which varied based on the interviewee's responses. However, the same interview structure and questions were utilized for all participants. The variations in total interview time, as indicated in the table, are attributed to differences in the interviewees' responses. All interviews were recorded and subsequently transcribed into an electronic spreadsheet. To facilitate data

analysis, the interview questions (Appendix A) were first translated from Brazilian Portuguese into English before being used for analysis along with the transcripts.

Table 1 - Respondents' Profile

Company	Company Description	Company Size	Interviewee's Position	Working time in the company	Interview duration
A	A multinational which its primary objective is to promote public health by providing its food products to the largest possible audience.	Large	Milk quality manager and project manager	11 years	34:31
B	Small domestic enterprise operates within the milk production sector.	Small	Owner	7 years	38:49
C	Small domestic enterprise operates within the milk production sector.	Micro	Owner	11 years	29:04
D	A farm who produces dairy products and other organic food items, and also operates its own supermarkets.	Medium	Owner	32 years	22:46
E	Small national property.	Small	Manager	7 years	27:10
F	A Brazilian micro-enterprise who produces dairy products.	Micro	Owner	17 years	20:26
G	A Brazilian micro-enterprise who produces dairy products.	Small	Manager	3 years	23:39
H	Large national farm operating in dairy sector.	Large	Zootechnician, manager of milk properties.	13 years	28:00
I	A Brazilian micro-enterprise who produces dairy products.	Micro	Owner	6 years	27:35

* The rating was based on the EUR-Lex (2016). Available in https://eur-lex.europa.eu/legal-content/PT/TXT/?uri=LEGISSUM%3An26026

Source: The Authors

2.2. Data analysis

To analyze data, the authors utilized the content analysis technique recommended by Bardin (2011). This technique consists of three distinct stages: 1) Pre-analysis, 2) Material exploration (or coding) wherein the recording unit, and 3) Results treatment, inference, and interpretation.

During the initial stages of analysis, the corpus is carefully chosen and thoroughly reviewed. In the subsequent stage of material exploration, the researcher identifies the recording unit (e.g., words, phrases, or themes that appear repeatedly in the corpus), the context unit (i.e., paragraphs or phrases that provide a framework for the recording unit and elucidate its significance), and the criteria for measuring the

recording units (e.g., presence, absence, frequency, or intensity). In the final stage, the researcher presents the analysis outcomes through various visual aids such as tables, diagrams, figures, or models, and conducts further treatment, inference, and interpretation of the results.

In the initial pre-analysis stage, the authors transcribed the complete interview data. Subsequently, in the analysis phase, the authors examined the transcripts and identified quotes that pertained to the research theme of the barriers and contributions of Lean in co-created agro-industrial services in dairy production, which were designated as context units. To differentiate the responses of the participants from different companies, alphabetical letters were assigned as identifiers, such that quotes from respondents affiliated with company A were labeled as "A," those from company B were labeled as "B," and so forth.

Next, the citations were subjected to thematic analysis, wherein they were categorized into different themes based on the problems and benefits observed and discussed in the context units, resulting in the development of research registration units. In the final phase of content analysis, the research team synthesized and highlighted the content analysis results by creating individual tables, arranged in descending order of frequency, to investigate the barriers and contributions of LT in co-created agro-industrial services in dairy production.

Subsequently, we analyzed the findings to ensure coherence among the context and registration units. The final chapter of the research paper was dedicated to discussing the research findings. Following the content analysis, seven registration units were identified to enumerate the barriers (Table 2), and eight registration units were identified to enumerate the contributions (Table 3) relevant to the research problem of investigating the barriers and contributions of Lean in co-created agro-industrial services in dairy production.

3. Findings and Discussion

3.1. Barriers

From the analysis of interviews, seven record units were generated, as presented in Table 2.

Table 2 – Barriers

Record unit	Context unit	Freq
Cultural Change	A- " Getting producers to accept and trust the new Lean methodology can be a real challenge, especially since it's only recently been introduced in the dairy sector. To make it work, producers have to be open-minded." B- "The sectors do not communicate with each other." B- " Changing our company's culture has been a challenge, we've had to change how we do things and follow new procedures. C- "The delay in the results." C- " Our employees aren't always documenting the animals' medications or results measurements and they're slow to adopt new strategies. We don't push too hard because it's hard for them to accept new ways of doing things. Usually, they start to adopt new strategies once they see positive results." D- " We tend to want everything to happen too quickly, but it takes time to implement new processes." D- " Our existing culture is a big obstacle." F- " We introduced the new tools gradually so that our employees could adapt to this new way of thinking." G - " When departments that have adopted Lean principles interact with those that haven't, it can create conflicts. People have different understandings of how things should be done and they treat problems in different ways." G- " The biggest problem we've faced is the lack of alignment between Lean thinking and our company's strategy. It's a cultural problem that starts with the owners and affects all the departments. Some people treat Lean as just another production tool."	10
Lack of Training	A- "The implementation team needs to be well-trained; they need to know what they're talking about to support the producers." B- "It was tough for our team to not have any supervisors who had been trained." B- "It was difficult to explain the idea to my manager." B- "We can't afford to delay milking, but the lack of internal training at the other company caused some major delays." G- "Our employees had a hard time getting used to some of the Lean tools, especially when it came to taking notes. This was a big obstacle for us." H- "Since many of our employees had a low level of education, we had to adopt a simpler language and tools to make it easier for them to understand." I- "Because many of our employees lacked education, we've had to implement Lean at a slower pace."	7
Lack of Discipline	A- " The owner, who is responsible for implementing Lean, needs to understand that it's his responsibility. If he steps away, it won't work. The owner's actions are decisive." A- " The owner shouldn't pass the project on to someone else. He needs to be actively involved in making decisions." B- "I struggle with staying focused and doing things slowly." C- " The owner needs to have the discipline to follow through with implementing Lean." E- " We need to have discipline and keep working on implementing Lean until it becomes second nature to everyone." G- " Without a central figure responsible for spreading the word about Lean, it's hard to get everyone on board and the implementation fails." I- "We don't have time to keep up with the latest Lean philosophy by taking courses or attending lectures."	7
Resistance to change	A- " The supplier who provides us with data is a challenge, especially a cost. We're worried that the other party might not act in good faith with the data and try to pay less, for example." A- " The producer doesn't always see the industry as a customer. They don't always think about their product meets the company's needs and quality expectations."	5

	C- " I presented the idea of applying Lean to other members of the Cooperative, but they weren't interested." H - " It's hard to implement Lean when not all partners are on board. Everyone needs to be on the same page and have the same idea." H - " Some producers were against the idea of implementing Lean."	
High employee turnover	B- " Recently, one employee's absence disrupted the process because their role was crucial and performed daily. We solved the problem by relocating another employee to cover their absence." D- "Some employees were not able to adapt and ended up leaving the company." G- "We had some employees who were not able to adapt to the new system, which had a positive impact on the company as it reduced turnover." H- "We have experienced employee turnover."	4
Conflict of interest	A- "There can be conflicts of interest with other consultants already working with the producer on different segments such as management, reproduction, or production costs, as they already have the trust of the producer and may interfere with the implementation of Lean." G- "I had difficulties cooperating with other companies when they demanded changes to our production system that would only benefit them." H- "Not all members use the cooperative's technical assistance, and this hinders the implementation of Lean tools as this assistance does not have a Lean vision."	3
Lack of Knowledge about Lean Methodology among producer	A- "At first, there weren't many companies who knew about this subject, most companies had no clue about this methodology." H- "There are only a few companies in the dairy sector that work with Lean, making it difficult to share knowledge with others." H- "Initially, the program was not well-structured, and it wasn't designed well for the livestock area."	3

Source: The Authors

The most frequent barrier identified by respondents was "Cultural change" Organizational management interacts with culture, which cannot be entirely controlled, but should be considered in the decision-making process (OLIVEIRA; DE LIMA, 2016). This is particularly relevant in Lean adoption since it impacts routine management, including individual behavior (ROTHER, 2019; FERENHOF et al., 2018).

"Companies of all sizes are striving to maximize opportunities and minimize the challenges of cultural differences. However, we need to realize that diversity can be a powerful and differentiating competitive factor" (MORAN; HARRIS; MORAN, 2007, p. 12). According to Hoecklin (1995), listening is a critical skill in dealing with cultural change. Moreover, it is essential to teach other team members about the new culture correctly. The ability to manage cultural change efficiently can enhance personal and professional effectiveness.

The "Lack of training" was a commonly identified barrier among dairy producers. According to Vemić (2006), the importance of human capital in organizations has been emphasized due to global competition and rapid changes, which require swift and effective knowledge acquisition. In today's economy, knowledge is becoming an

essential source of competitive advantage. The interviewees highlighted the lack of discipline in training, especially among producers themselves. In this sense, the training can be stimulated based on LT, for example, the Toyota Kata concept is a Lean solution to create and share knowledge among the actors of the dairy sector (FERENHOF, et al., 2018).

Jehanzeb and Bashir (2013) argued that systematic training and development programs for employees can help organizations retain valuable human resources and remain competitive in the market. Interviewees noted that the absence of trained supervisors was a significant challenge for the team and the lack of trained professionals had negative impacts on production.

The issue of "Lack of discipline" was frequently raised by the interviewees, particularly by the producers. One respondent, (G), highlighted the importance of discipline in ensuring that tasks are carried out efficiently and effectively. This sentiment is in line with the literature, which emphasizes the importance of discipline as a fundamental aspect of Lean thinking. According to Womack and Jones (1997), discipline is required to maintain adherence to Lean principles and sustain the improvements achieved. Without discipline, there is a risk that the gains made through Lean implementation will be lost over time.

The concept of “Resistance to change” refers to the inclination of an individual or a group to oppose social norms that aim to lead the system toward a new equilibrium level (LEWIN, 1947). Grama and Todericiu (2016) assert that employees' attitude toward organizational change is influenced by their prior experiences, available information, and individual cognitive processes. Furthermore, Hernandez and Caldas (2001) highlight that the resistance to change concept in management literature often assumes that managers or change agents are responsible for introducing or implementing change, while the employees' role is to resist change.

According to Dora, Kumar, and Gellynck (2016) and Melin and Barth (2018), the successful application of Lean principles depends on various factors such as the absence of discipline and lack of training among managers and employees. Altorfer (1992) suggests that when resistance arises, it is important to identify the root cause rather than treating only the symptom.

One of the challenges encountered by certain participants of the survey is “High employee turnover”, as mentioned by interviewed (D). Mobley (1992) posits that high

turnover has implications for production, organizational climate, and interpersonal relationships, similar to how low turnover can suggest stagnation in the company's workforce. In the current job market, employees tend to seek better opportunities and higher salaries, leading to job changes, which are referred to as turnover, that is, employee departures from a company and their subsequent replacement (PINHEIRO; SOUZA, 2013). The departure of employees, their replacement, and the training of new staff entail costs for the company. Ongori (2007) defines employee turnover as the turnover of workers in the labor market, involving movements between companies, jobs, occupations, and employment and unemployment states.

Another factor identified as a barrier is the “Conflict of interest”. Power and interest conflicts are inherent in organizational dynamics. Lana et al. (2016) posit that these processes often result in internal disputes among areas, departments, divisions, and boards. The study of individuals who administer, manage, and operate various company businesses becomes necessary to address power conflicts within the organizational context.

De Andrade and Ramos (2018) highlight that the majority of conflicts arise from communication issues. When individuals feel important and competent, conflicts are more likely to be resolved without being taken personally.

The last barrier observed is the “Lack of knowledge about Lean Methodology among Producers”. Perez et al. (2010) note that large companies with qualified workforces can comprehend the need for collaboration and possess knowledge of LT tools. However, small and medium producers are rarely equipped with such qualifications. Notwithstanding, networking and cooperation among companies are crucial in overcoming this barrier. Respondent (A) highlights that he had difficulties to cooperate with other companies because of their demands that would only benefit them and interviewee (H) said that there are only a few who have implemented Lean in their business. Hence, the barrier to co-creation in services identified by Bonamigo et al. (2020) is evident in the dairy agro-industrial context.

3.2. Contributions and practical implications

The contributions identified from the analysis of interviews conducted with producers and technicians from dairy farms who applied Lean Thinking in the context of value co-creation were categorized into eight registration units. Table 3.

Table 3 – Contributions

Record unit	Context unit	Frq
Improvement in Management	A- "Lean allows processes evolution, doing more with less, and enables controlling the production steps." B- "It helps us figure out what the company needs, whether investing is a must-have or just a nice-to-have." B- "I can evaluate investments better now. I'm clearer on what the company needs, which helps us avoid wasting time and money on unnecessary investments." C- "Standardization and regular maintenance monitoring with Lean make production easier and reduce breakdowns like busted tractor clutches with monthly maintenance." C- "Using Lean gives small farms an edge." D- "Lean gives me more clarity on the process and objective, and helps me stay disciplined." D- "The company's organization improved with process mapping and clearer indicators, making it easier to co-create value and see results." D- "Lean helps us measure the results of our partnerships and co-creation efforts." D- "With Lean, I understand what value is." I- "We focus more on people to succeed." E- "Support from the cooperative and specialized technicians helped solve the problem by applying Lean philosophy more consistently, reminding us of its purpose." F- "I have clearer financial management now. I can see where the costs are, where to invest, and where not to. I can also map the property and know when to spend and invest." F- "Knowing the history of our animals helps us decide better, along with having more process information." F- "Working with the cooperative helped me pay more attention to quality and understand how to assess the quality of my products." H- "Knowing more about the business improved the producer's organization, giving them a better understanding of their data and where to focus their efforts on the property. They now have a broader view of the business, manage better, and have a healthier life without getting bogged down in operations."	15
Increased employee loyalty	B- "Our farm's daily organization has improved a lot, with employees working more harmoniously and deliveries becoming more efficient." D- "I have started to recognize the talents within our company and have been investing in the development of our current employees to help us better position ourselves in the market." D- "Our employees are now more engaged and committed to the company" E- "Since implementing Lean thinking on our farm, our daily routines have become much smoother and more enjoyable for everyone involved." E- "Our team has become more involved in the decision-making process and we actively seek out employee feedback before making investments." F- "Our employees appreciate the greater level of participation they now have within the company. They feel a sense of ownership and responsibility for the final results." G- "With greater team engagement, our employees now see their work differently. They participate more actively, offer proactive solutions to problems, and have a better sense of the workplace's organization." H- "After implementing Lean processes on our farm, we have seen a decrease in labor turnover." H- "Engaged employees are more motivated and committed to our success."	11

	I- "Employee loyalty and the value of people are crucial components of Lean thinking. By prioritizing people management, financial success becomes a natural consequence." I- "Lean thinking generates interest in employees, makes it easy to bring in employees."	
Acquisition of new Knowledge	A- "They already have high milk quality performance; they need to maintain or improve it. Continuously improving these performance indicators makes sense." A- "A research program within farms generates performance indicators to understand how farms are performing." B- "There is a group of dairy farmers that share research information about calves, such as their structure, breastfeeding, and research results. This helps with problem-solving through the exchange of experiences." B- "Co-creation with another company helps to train the farm team and provides knowledge about possible problems with the machines. This is also a benefit for their team, as they can analyze the milking process in practice." D- "Cooperation allows for new product varieties. For our farm, we were able to produce bio-fortified cassava, in addition to other products besides milk." G- "Partnerships that conducted research experiments within the farm without changing the routine did not deliver the results to the farm. However, it was a benefit for those who participated in learning how the industry works and providing social benefits." G- "Co-creation helps to spread the Lean system and demonstrate that it can be used in various industries." G- "Lean thinking changes the way people live and think about things they didn't consider before. This is beneficial for the company and society." H- "The cooperative improved the succession process." H- "Other cooperatives have started implementing Lean and have been looking to our cooperative to exchange experiences in applying this thinking in the dairy sector." I- "Due to limited access to people who were far away, we brought the Lean course closer to the producer."	11
Assistance and supply of inputs	C- "Cooperating and sharing resources and techniques can help businesses survive." D- "Co-creation can provide access to more resources and help businesses make progress." E- "Technical assistance is helpful for financial stability. The cooperative offers access to resources at better prices and with price stability." E- "The cooperative provides growth opportunities, with a good technical team, a cooperative culture, and experience with Lean Thinking." F- "The cooperative helped me learn how to produce milk. With their technical assistance and the application of Lean Thinking, my property improved, and we were able to grow and invest in new opportunities." G- "Lean philosophy has reduced the number of problems with lack of materials and stock. It has also systematized activities, deliveries, and tasks across the company and sectors." H- "As cooperators become stronger, the cooperative grows as well. The benefits of cooperation and exchange are much greater after implementing Lean." I- “The cooperative has enhanced its document organization, thereby facilitating registration for multiple services. Additionally, they provide valuable support for Lean implementation and offer assistance with animal nutrition and care." I- "The cooperative is a reliable partner in our Lean implementation efforts, and they also provide essential resources such as animal nutrition and supplies, as well as outsourced managerial, technical, and veterinary assistance." I- "The acquisition of numerous inputs is a complex undertaking for any multi-product business. Fortunately, the cooperative play a pivotal role in managing input purchases, thus reducing the need for dedicated personnel in this area."	10
Improvement in product quality	A- "We aim to achieve standardization in our production process and reduce product variation through the implementation of Lean. This will ultimately result in lower production costs and greater production stability."	8

	A- "Our goal is to improve the quality of the milk used for yogurt production by collaborating with milk suppliers. This will allow us to enhance the quality indicators of the milk and, consequently, of the yogurt produced from it." A- "We expect Lean to address concerns regarding performance indicators, milk quality, and levels of fat and protein." B- "The adoption of Lean methodology has successfully reduced product variation, resulting in a significant reduction in rework and improved efficiency." E- "Since we started using Lean, I have been able to get a better understanding of what our customers want. This has helped me provide them with higher quality products while also increasing our volume." E- "I have observed an improvement in milk quality, which has allowed us to increase both milk volume and our livestock inventory annually." F- "The implementation of Lean has provided me with access to all necessary indicators of milk quality, resulting in an overall improvement in the quality of our milk production." H- "By adopting the Lean philosophy, we have been able to enhance both the quality of our products and the overall quality of life for our stakeholders through the delivery of higher quality goods."	
Problem-solving ability	A- "Producers who adopt a more controlled approach to their business can benefit from reduced costs, less waste, and a more competent workforce capable of solving problems on the farm." B- "We have found that adopting a more systematic approach to daily operations has led to faster problem resolution and greater overall organization within the different sectors of the farm. This increased efficiency allows us to accomplish more." B- "Through our adoption of Lean practices, we have been able to take a more objective view of our processes. Instead of placing blame on individuals, we focus on improving the processes themselves, which has resulted in greater efficiency." E- "Lean principles promote a shift in mindset and encourage teams to identify areas for improvement and develop creative solutions to problems." F- "Thanks to Lean, I now have a clearer understanding of the entire production process. By having access to relevant indicators, I am better equipped to make informed decisions." I- "By embracing Lean principles, individuals on the farm are more attuned to identifying problems in their daily work and feel more invested in the overall success of the operation. This increased sense of ownership and responsibility leads to greater efficiency and effectiveness."	6
Increased confidence	A- "The proposal to add value to milk products will create loyalty between milk suppliers and our yogurt-producing company. By providing knowledge, our company has helped these farms produce more, with better quality and in a more stable way, resulting in positive financial results for the producers. As a result, they recognize that our company has helped improve their business through standardized processes, lower costs, and better indicators." B- "Although we had a problem with a company in the past, we were able to resolve it through objective focus, dialogue, and transparency. Since then, we have not encountered any further issues with this company." F- "We are highly satisfied that the cooperative values all member farms equally, regardless of size. We feel appreciated within the cooperative and enjoy all the benefits that it offers. The cooperative is also invested in supporting children and sustaining our businesses. We have received tremendous support from them." G - "Our relationship with the industry has improved greatly since implementing a timetable for product supply and standardizing methods, which has reduced unforeseen events and delays." H- "We have experienced an improvement in qualitative indices, an increased level of trust between the cooperative and its members, as well as with the technical assistance provided."	5
Increased Profit	A- "With Lean, the product becomes more profitable. We can produce more yogurt using less milk, thanks to the higher quality of milk." E- "I was able to reduce my expenses and track where the money was going, and we also increased profits."	5

	H- "The business became more professional, stronger, and generated more profits." H- "The income of producers increased." I- "We achieved financial gains with Lean, and we always strive to avoid wasting time and resources."

Source: The Authors

For the "Improvement in management" category, Catelli (2001) defines it as the actions taken by company administrators to optimize all resources, products, services, investments, and flows, while considering all external and internal factors that have an economic, operational, and resource impact on these companies.

However, to ensure business sustainability in a constantly evolving and highly competitive market, competent and qualified management is essential, particularly for small milk producers (TORRES AND LIMA, 2012). The adoption of Lean practices can improve organizational performance and reduce costs. Consequently, implementing LT in dairy farms has enhanced production control, as reported by interviewee (D).

The unit of "Increased employee loyalty" was reported by seven out of nine interviewees, indicating that employees began to exhibit greater commitment and engagement in the activities of the dairy farm as stated said by the respondent (F). Seles et al. (2019) assert that employees are a company's greatest competitive advantage and should therefore be treated appropriately. However, if a company lays off many employees when implementing Lean practices, it may be perceived negatively by the workforce, potentially hindering support for such changes. This research identified that some respondents indicated that their employees felt more motivated and appreciated the improvements they noticed after adopting LT.

Although "High employee turnover" was one of the challenges mentioned during the implementation of Lean Thinking on farms, most of the respondents reported that the employees who adapted to this new philosophy felt more motivated, and as a result, the turnover rate decreased.

The knowledge garnered from the application of Lean philosophy was identified as a valuable contribution by multiple interviewees. Such contributions can be considered as "Acquisition of new knowledge" units. As reported by Greef and Freitas (2012), the effective understanding and optimization of information flows enable stakeholders to align these flows with the expected value, thereby facilitating the holistic planning of all constituents of the pertinent environment in an integrated manner.

Cooperatives often serve as an essential source of supply and inputs, technical and veterinary assistance, and managerial support for their members (BREITENBACH; BRANDÃO; ZORZAN, 2017). Our research findings corroborate this notion, as the "Assistance and supply of Inputs" unit demonstrated that almost all interviewees acknowledged the support they receive from their respective cooperatives.

According to Wang, Zhu, and Zhang (2016), agricultural producers face numerous challenges, such as low levels of informatization, a lack of knowledge about emerging technologies, and high adaptation costs to compete in the market. The support provided by cooperatives allows these producers to access new techniques and technologies, which can increase their profits. Some of our interviewees have observed these improvements with the assistance of their cooperatives.

As Zhong, Zhang, and Bijman (2018) suggest, the benefits derived from cooperatives are typically distributed among their members, leading to economic and social sustainability. Additionally, our interviewees noted that collaboration with other actors often resolves some of the challenges they face. For instance, the training provided, experiences shared, and knowledge exchange facilitated by cooperatives can assist producers in implementing Lean methodologies on their farms, thus addressing issues such as "Lack of training" and "Lack of knowledge about Lean methodology among producers."

One of the units identified in our study was "Improvement in product quality." For companies that implement the Lean philosophy on their milk suppliers' farms, the expectation is that product quality will improve.

To Juliá-Igual, Meliá-Martí, and García-Gimenez (2012), cooperative assistance or collaboration with other actors can improve the quality of the service provided, by meeting consumer demands, such by adding nutritional value, and product value can be increased by quality improvement. This highlights how value co-creation between a company and its suppliers can result in products of higher quality, meeting the expectations of end consumers and generating greater profits for both parties. In addition to value co-creation, implementing LT within milk farms enables managers to identify the value for their end consumers and subsequently add value, thereby improving product quality (VILLARREAL et al., 2017b; MELTON, 2005).

The "Problem-solving ability" unit pertains to the respondents' improved capability to solve problems by implementing Lean tools on their farms. The acquisition of new knowledge allows producers to think and solve problems within their productive contexts (ROBERTS; BALL, 2009). Through specialization in Lean implementation, producers can develop a new mindset and easily identify and solve potential problems on their farms. This is exemplified by interviewees who have demonstrated an improved problem-solving ability. According to Taylor (2005), the Value Chain Analysis (VCA) tool allows the entire team involved in the production process to understand the production flow and identify problems in the organization, which facilitates their resolution.

Another contribution identified from the interviews was "Increased Confidence". According to interviewee A, the expectation from the Lean implementation on milk farms is that they recognize the improvements they have obtained with the company's help. As a result, these milk suppliers can sell their products to the company that supported the Lean implementation, generating more trust between the parties involved.

To establish trust among organizations, Sanzo et al. (2015) suggest that managers engaged in the value co-creation process should create a team with members from all parties involved to work together. In our research, the respondent (B) reported a negative experience with group research, but they were able to resolve the issue, this demonstrates the importance of aligning objectives among all parties involved.

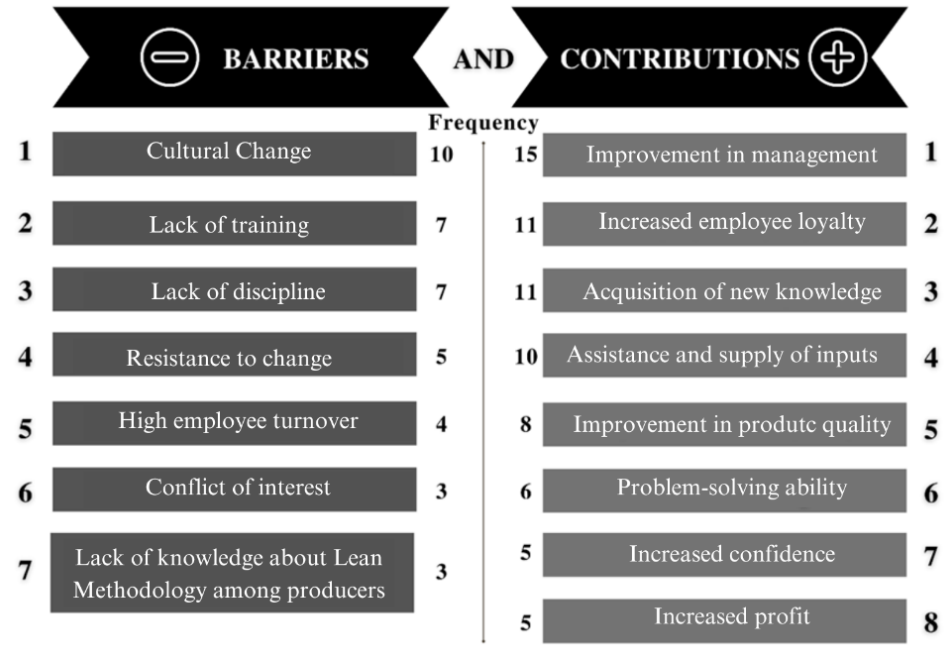
The cooperativism benefit is more significant for large dairy producers than small producers, enabling these large producers to rank higher through the cooperative assistance benefits (ALHO, 2015). However, respondent (F) reported that the cooperative does not discriminate against smaller producers and provides all inputs and assistance equally to all members, which has resulted in satisfaction and increased confidence in the cooperative services.

The final recorded contribution is related to the "Increased Profit" unit. The implementation of management techniques that focus on sustainable practices enables farmers to produce more with fewer resources, which results in higher profits. Public policies and technical assistance from cooperatives can also contribute to this outcome (ZANIN et al., 2020). Interviewee I, reported that their concern was to

eliminate waste found in their production processes, and the implementation of Lean Thinking helped in this aspect, resulting in increased profits.

Thus, an organization that meets the requirements of the final consumer can offer excellent products. Consequently, this can lead to a decrease in customer complaints and an increase in the company's reputation, resulting in higher profits (YU, 2013). Once the barriers and contributions of Lean in co-created agro-industrial services in dairy production were empirically recognized, we summarized the findings in Figure 2.

Figure 2 - Barriers and contributions linked the Lean adoption in dairy production



Source: The Authors

4. Conclusion

This study aimed to identify the barriers and contributions of Lean implementation in co-created agro-industrial services in dairy production. To achieve this goal, multiple case studies were conducted across nine farms that have implemented Lean. Based on the analysis of the content from nine interviews, we have observed seven barriers to adopting Lean thinking in co-created agro-industrial services, namely: 1) Cultural change, 2) Lack of training, 3) Lack of discipline, 4) Resistance to change, 5) High employee turnover, 6) Conflict of interest, and 7) Lack of knowledge about Lean methodology among producers. In addition, based on the

interviews, our study identified eight contributions of Lean implementation, including 1) Improvement in management, 2) Increased employee loyalty, 3) Acquisition of new knowledge, 4) Assistance and supply of inputs, 5) Improvement in product quality, 6) Problem-solving ability, 7) Increased confidence, and 8) Increased profits.

Based on the research findings, it is evident that cooperatives play a critical role in ensuring the longevity of small and medium-sized producers in the market. Moreover, the support that cooperatives provide in the adoption of the Lean philosophy in the daily operations of farms has enabled the mitigation of losses, improved service levels, and creation of competitive advantages. Furthermore, the study revealed the importance of cooperatives in overcoming these obstacles as they facilitated the team and administration's commitment to implementing this emerging philosophy, which is well-established in various economic sectors such as manufacturing but still emerging in the agro-industrial context.

Thus, the barriers and contributions of Lean in the dairy agro-industrial sector presented in this study can guide public policies, scientific research, and industry players in stimulating the development of dairy production from a LT perspective.

According to the interviews analyzed, it was evident that a change in the culture of farm employees is one of the primary obstacles to adopting Lean practices. To overcome this barrier, value co-creation can be a useful approach as resistance to change is often linked to a lack of knowledge and information.

However, the adoption of LT with value co-creation in the dairy sector brings several advantages, such as knowledge and resource sharing among actors. This approach led to an increase in milk quality, higher profits, and greater employee satisfaction, among other benefits reported in this study. Improving milk quality satisfies consumers while increasing employee satisfaction leads to greater joy at work. This study also identified certain limitations, such as the lack of support material from some organizations due to confidentiality concerns and the fact that our research was conducted solely with dairy farms in Brazil, which may affect the generalizability of our results.

Referências

ALHO, E. Farmers' self-reported value of cooperative membership: evidence from heterogeneous business and organization structures. A**gricultural and Food Economics**, v. 3 v.1, p.1-22, 2015. DOI: https://doi.org/10.1186/s40100-015-0041-6

ALTORFER, O. How can we help one worker?. **The Journal for Quality and Participation**, v.15 n.4, p.88-93, 1992.

BARDIN, L. **Análise de conteúdo**. 70. ed. Lisboa, 2011.

BARNARD, F.L.; FOLTZ, J.; YEAGER E.A.; BREWER, B. **Agribusiness Management Routledge**. 6.ed. London, 2020. DOI https://doi.org/10.4324/9780429324420

BITZER V.; BIJMAN, J. From innovation to co-innovation? An exploration of African agrifood chains. **British Food Journal**, v.117 n.8, p.2182-2199, 2015. DOI https://doi.org/10.1108/BFJ-12-2014-0403

BONAMIGO, A.; DETTMANN, B.; FRECH, C.G.; WERNER, S.M. Facilitators and inhibitors of value co-creation in the industrial services environment. **Journal of Service Theory and Practice**, v.30, n.6, p.609-642, 2020. DOI https://doi.org/10.1108/JSTP-03-2020-0061

BONAMIGO, A.; FERENHOF, H.A.; FORCELLINI, F.A. Dairy production diagnosis in Santa Catarina, Brazil, from the perspective of business ecosystem. **British Food Journal**, v.118, n.9, p. 2086-2096, 2016. DOI https://doi.org/10.1108/BFJ-04-2016-0153

BONAMIGO, A.; FRECH, C.G.; LOPES, C.C. Value co-creation in the B2B context: a diagnosis of knowledge management based on multiple case studies. **Journal of Business & Industrial Marketing,** v. 7 n. 37, p. 1449-1462, 2021. DOI https://doi.org/10.1108/JBIM-11-2020-0528

BREITENBACH, R.; BRANDÃO, J.B.; ZORZAN, M.J.I. Vantagens e oportunismo no relacionamento entre associados e cooperativa de laticínios Interações. **Revista Internacional de Desenvolvimento Local,** v.18 n.2, p.45-58, 2017. DOI https://doi.org/10.20435/inter.v18i2.1393

CATELLI, A. **Controladoria: uma abordagem da gestão econômica–GECON**. 2. ed. Atlas, São Paulo, 2001.

CAUCHICK-MIGUEL, P.A.; et al., **Metodologia de pesquisa em engenharia de produção e gestão de operações**. 3. ed. Elsevier, Rio de Janeiro, 2010.

CHALA, A.R.; BERMUDEZ, G.M.T.; MOLANO, J.I.R. Co-creation Model in Small and Medium Businesses: Case Study of the Colombian Dairy Sector. **International Conference on Data Mining and Big Data**, v. 10943, n. 1, p.767-776, 2018. DOI https://doi.org/10.1007/978-3-319-93803-5_72

CHIESA, V.; FRATTINI, F.; LAZZAROTTI, V.; MANZINI, R. How do measurement objectives influence the R&D performance measurement system design? Evidence from a multiple case study. **Management Research News**, v.30 n.3, p.187-202, 2007. DOI https://doi.org/10.1108/01409170710733269.

CUER, L.; BERNARDO, C.; SCALCO, A. Lean Approach In The Agrifood Chain: A Systematic Bibliographic Review. **Revista de Gestão e Projetos GeP**, v.10 n.2, p.98-106, 2019. DOI https://doi:org/10.5585/gep.v10i2.10831

DE ANDRADE, A.S.; RAMOS, R.J. Como melhorar a capacidade de produção do colaborador utilizando as ferramentas MBTI, FIRO-B e TKI. **Contribuciones a la Economía, Servicios Académicos Intercontinentales SL,** v.1, n.1, p.1-13, 2018.

DENTONI, D.; BITZER, V.; PASCUCCI, S.J. Cross-sector partnerships and the co-creation of dynamic capabilities for stakeholder orientation. **Journal of Business Ethics**, v.135 n.1, p.35-53, 2016. DOI https://doi.org/10.1007/s10551-015-2728-8

DORA, M.; KUMAR, M.; GELLYNCK, X Determinants and barriers to Lean implementation in food-processing SMEs–a multiple case analysis. **Journal of Production Planing and Control**, v.27, n.1, p.1-23, 2016. DOI https://doi.org/10.1080/09537287.2015.1050477

EDMONDSON, A. Psychological safety and learning behavior in work teams. **Administrative Science Quarterly**, v.44, n.2 , p.350 –383, 1999. DOI https://doi.org/10.2307/2666999

EISENHARDT, K.M. Building theories from case study research. **Academy of Managemente Review**, v.14, n.4, p.532-550, 1989. DOI https://doi.org/10.5465/amr.1989.4308385

FERENHOF, H.A.; DA CUNHA, A.H.; BONAMIGO, A.; FORCELLINI, F.A. Toyota Kata as a KM solution to the inhibitors of implementing Lean service in service companies. **VINE Journal of Information and Knowledge Management Systems**, v.48, n.3, p.404-426, 2018. DOI https://doi.org/10.1108/VJIKMS-11-2017-0083

FERENHOF, H. A., BONAMIGO, A., CUNHA, A. D., TEZZA, R., FORCELLINI, F. A. Relationship between barriers and key factors of dairy production in Santa Catarina, Brazil. **British Food Journal**, Vol. 121, n. 2, pp. 304-319, 2019.

FRANKLIN, K.; OEHMKE, J. Building African Agribusiness through Trust and Accountability. **Journal of Agribusiness in Developing and Emerging Economies**, v. 9, n.1, p.22-43, 2019. DOI https://doi.org/10.1108/jadee-01-2018-0005

GRAMA, B.; TODERICIU, R.J. Change, Resistance to Change and Organizational Cynicism. **Studies in Business & Economics**, v.11, n.3, p.47-54, 2016. DOI https://doi.org/10.1515/sbe-2016-0034

GREEF, A.C.; FREITAS, M.C.D. Fluxo enxuto de informação: um novo conceito. **Perspectiva em Ciência da Informação**, v.17 n.1, p.37-55, 2012. DOI https://doi.org/10.1590/S1413-99362012000100003

HAKIMI, S.; ZAHRAEE, S.M.; MOHD, J. R. Application of Six Sigma DMAIC methodology in plain yogurt production process. **International Journal of Lean Six Sigma**, v. 9, n. 4, p. 562-578, 2018. DOI https://doi.org/10.1108/IJLSS-11-2016-0069

HALINEN, A.; ANDTÖRNROOS, J.Å.J. Using case methods in the study of contemporary business networks. **Journal of Business Research**. v.58, n.9, p.1285-1297, 2005. DOI https://doi.org/10.1016/j.jbusres.2004.02.001

HERNANDEZ, J.M.C.; CALDAS, M.P. Resistência à mudança: uma revisão crítica. **Revista de Administração de Empresas,** v.41, n.2, p.31-45, 2001. DOI https://doi.org/10.1590/S0034-75902001000200004

HERRIOTT, R.E.; FIRESTONE, W.A. Multisite qualitative policy research: Optimizing description and generalizability. **Journal of Educational Researcher**, v.12, n.2, p.14-19, 1983. DOI https://doi.org/10.3102/0013189X012002014

HINES, P.; HOLWEG, M.; RICH, N. Learning to evolve: A review of contemporary Lean thinking International. **Journal of Operations & Production Management**, v.24, n.10, p.994-1011, 2004. DOI https://doi.org/10.1108/01443570410558049

HOECKLIN, L. **Managing cultural differences: strategies for competitive advantage**. 1. ed. Addison-Wesley. Workingham, 1995.

JADHAV, J. R.; MANTHA, S. S.; RANE, S. B. Exploring barriers in Lean implementation. **International Journal of Lean Six Sigma**, v.5, n.2, p.122-148., 2014. DOI https://doi.org/10.1108/IJLSS-12-2012-0014

JEHANZEB, K.;BASHIR, N.A. Training and development program and its benefits to employee and organization: A conceptual study. **European Journal of Business and Management**, v.5, n.2, p.80-86, 2013.

JULIÁ-IGUAL. J.F.; MELIÁ-MARTÍ. E.; GARCÍA-MARTINEZ, G. Strategies developed by leading EU agrifood cooperatives in their growth models. **Service Business**, v.6, n.1, p.27-46, 2012. DOI https://doi.org/10.1007/s11628-011-0129-3

KIMARO, E.M.; KISAWIKE, B.; RUOJA, C. Lean Supply Chain Strategy and Performance of Dairy Industry in Iringa Region, Southern Highlands of Tanzania**. Journal of Procurement & Supply Chain**, v.5, n.2, p.21-3, 2021. DOI https://doi.org/10.53819/81018102t3001

LANA, R.D.; PAINES, P.A.; BONALDO, S.A.; MÜLLER, F.M. As organizações como fonte de conflitos de poder. **Revista de Administração da Universidade Federal de Santa Maria**, v. 9, n.3, p.506-519, 2016.

LEE, S.M.; OLSON, D.L.; TRIMI, S. Co-innovation: convergenomics, collaboration, and co-creation for organizational values. **Management Decision**, v.50, n. 5, p. 817-831, 2012. DOI https://doi.org/10.1108/00251741211227528

LEWIN, K.J. Frontiers in group dynamics: II. Channels of group life; social planning and action research. **Human Relations**, v.1, n.2, p.143-153, 1947. DOI https://doi.org/10.1177/001872674700100201

LOURENÇO. J.C.; DE LIMA, C.E.B. Evolução do agronegócio brasileiro, desafios e perspectivas, 2009. avaliable at: http://www.eumed.net/cursecon/ecolat/br/09/clbl.htm Acessed in December 1, 2021.

MAGLIO, P.P.; VARGO, S.L.; CASWELL, N.; SPOHRER, J. The service system is the basic abstraction of service science. **Information Systems and Business Management**, v.7, n.4, p.395-406, 2009. DOI https://doi.org/10.1007/s10257-008-0105-1

MELIN, M.; BARTH, H. Lean in Swedish agriculture: strategic and operational perspectives. **Information Systems and Business Management,** v.29, n.10, p.845-855, 2018. DOI https://doi.org/10.1080/09537287.2018.1479784,

MELTON, T.J. The benefits of Lean manufacturing: what Lean thinking has to offer the process industries. **Chemical Engeneering Research and Design**, v.83, n.6, p.662-673, 2005. DOI https://doi.org/10.1205/cherd.04351

MOBLEY, W.H. **Turnover: causas, consequências e controle**. 1. ed Ortiz. Porto Alegre, 1992.

MORAN, R.T.; HARRIS, P.R.; MORAN, S. **Managing cultural differences: Global Leadership Strategies for the 21st century.** 8. ed. Routledge. London and New York, 2007.

NIELSEN, V.F.; PEJSTRUP, S. **Lean in Agriculture: Create More Value with Less Work on the Farm.** 1. ed. Routledge. New York. 2018.

OLIVEIRA, R.R.; DE LIMA, J.B. Reflexão sobre a relação entre a mudança de cultura organizacional e a gestão do conhecimento. **Perspectivas em Gestão & Conhecimento**, v.6, n.1, p.19-35, 2016.

ONGORI, H. A review of the literature on employee turnover. **Academic Journals**, v.1, n.3, p.49-54, 2007.

PEREZ, C.; GIMENEZ, G.; DE CASTRO, R.; SIMONS, D. Development of Lean supply chains: a case study of the Catalan pork sector. **Supply Chain Management: An International Journal**, v.15, n.1, p.55-68, 2010. DOI https://doi.org/10.1108/13598541011018120

PINHEIRO, A.P.; SOUZA, D.A. Causas e efeitos da rotatividade de pessoal/turnover: Estudo de caso de uma microempresa do setor de educação. In Simpósio De Excelência em Gestão e Tecnologia, 20, **Fatec**, 2013, v.1, n.1, pp.49-54

PINHO, N.; BEIRÃO, G.; PATRÍCIO, L.; FISK RP Understanding value co-creation in complex services with many actors. **Journal of Service Management,** v.25, n.4, p.470-493, 2014. DOI https://doi.org/10.1108/JOSM-02-2014-0055

PLÉ, L. Studying customers resource integration by service employees in interactional value co-creation. **Journal of Services Marketing,** v.30, n.2, p.152-164, 2016. DOI https://doi.org/10.1108/JSM-02-2015-0065

ROBERTS, T.G.; BALL, A.L.J. Secondary Agricultural Science as Content and Context for Teaching. **Journal of Agricultural Education,** v.50, n.1, p.81-91, 2009.

ROTHER, M. **Toyota Kata: Managing people for improvement, adaptiveness and superior results**. 1. ed. MGH. New York. 2019.

ROZENFELD, H.; FORCELLINI, F.A.; AMARAL, D.C.; TOLEDO, J.C.; SILVA, S.L.; ALLIPRANDINI, D.H.; SCALICE, R.K. **Gestao de desenvolvimento de produtos: uma referência para a melhoria do processo**. 1. ed. Saraiva. São Paulo. 2006.

SANZO, M.J.; ALVAREZ, L,I.; REYM, M.; GARCÍA, N. Business–nonprofit partnerships: a new form of collaboration in a corporate responsibility and social innovation context. **Service Business,** v.9, n.4, p.611-636, 2015. DOI https://doi.org/10.1007/s11628-014-0242-1

SATOLO, E.G.; HIRAGA, L.E.; LOURENZANI, W.L.; GOES, G.A. Lean production in agribusiness organizations: multiple case studies in a developing country. **International Journal of Lean Six Sigma,** v.8, n.3, p.335-358, 2017. DOI https://doi.org/10.1108/IJLSS-03-2016-0012

SELES, B.M.R.P.; FIDELIS, R.; MARCO-FERREIRA, A.; STEFANELLI, N.O. Lean and Green: practices, paradigms and future prospects. **Benchmarking: An International Journal,** v.27, n.7, p.2077-2107, 2019. DOI https://doi.org/10.1108/BIJ-12-2018-0415

SHAMAH, R.A.M. Measuring and building Lean thinking for value creation in supply chains. **International Journal of Lean Six Sigma**, v. 4 n. 1, p. 17-35, 2013. DOI https://doi.org/10.1108/20401461311310490

SIGGELKOW, N.J. Persuasion with case studies. **Academy of Managemente Journal**, v.50, n.1, p.20-24, 2007. DOI https://doi.org/10.5465/amj.2007.24160882

SØNDERGAARD, N. Food regime transformations and structural rebounding: Brazilian state–agribusiness relations. **Territory, Politics, Governance,** v. 11, . 1, p. 60-79, 2023

TAYLOR, D.H. Value chain analysis: an approach to supply chain improvement in agri-food chains. **International Journal of Physical Distribution & Logistics Management,** v.35, n.10, p.744-761, 2005. DOI https://doi.org/10.1108/09600030510634599

TORRES, N.M.F.; LIMA, A.F.A. Gestão de custos em pequenas propriedades rurais– estudo de caso programa mais leite. **Revista UNEMAT de Contabilidade,** v.1, n.1, p.1-23, 2012. DOI https://doi.org/doi.org/10.30681/ruc.v1i1.741

VARGO, S.L.; MAGLIO, P.P.; AKAKA, M.A. On value and value co-creation: A service systems and service logic perspective. **Europena Management Journal,** v.26, n.3, p.145-152, 2008. DOI https://doi.org/10.1016/j.emj.2008.04.003

VEMIĆ, J.J. Employee training and development and the learning organization. **Facta Universitatis-series: Economics and Organization,** v.4, n.2, p.209-216, 2006.

VILLARREAL, B.; GARZA-REYES, J.A.; KUMAR, V.; LIM, M.K. Improving road transport operations through Lean thinking: A case study. **International Journal of Logistics Research and Applications,** v.20, n.2, p.163-180, 2017. DOI https://doi.org/10.1080/13675567.2016.1170773

WANG, J.; ZHU, X.; ZHANG, C. Models of Chinas E-commerce in the agricultural sector: An exploratory study. **International Journal of u- and e- Service, Science and Technology,** v.9, n.4, p.389-400, 2016. DOI https://doi.org/10.14257/ijunesst.2016.9.4.38

WOMACK, J.P.; JONES, D.T.; ROOS, D. **The machine that changed the world: The story of Lean production--Toyota's secret weapon in the global car wars that is now revolutionizing world industry**. 5. ed. Simon & Schuster, New York, 2007.

WOMACK, J.P.; JONES, D.T.J. Lean thinking—banish waste and create wealth in your corporation. **Journal of the Operational Research Society,** v. 48, n.11, p.1148-1148, 1997. DOI https://doi.org/10.1057/palgrave.jors.2600967

YADAV, V.; JAIN, R.; MITTAL, M. L.; PANWAR, A.; SHARMA, M.K. An appraisal on barriers to implement Lean in SMEs. **Journal Of Manufacturing Technology Management,** v.30, n.1, p. 195-212, 2019. DOI https://doi.org/10.1108/JMTM-12-2017-0262

YAUCH, C. A.; STEUDEL, H. J. Complementary use of qualitative and quantitative cultural assessment methods. **Organizational Research Methods**, v.6, n. 4, p.465-481, 2003. DOI https://doi.org/10.1177/1094428103257362

YIN, R. **Case study research: design and method.** 5 ed. Sage Publications, California, 2014.

YIN, R. **Estudo de Caso, planejamento e métodos**. 2. ed. Bookman, São Paulo, 2001.

YU, K.T. A measurement model for service capability from the customer perspective. **Service Business,** v.7 n.4, p.563–582, 2013. DOI https://doi.org/10.1007/s11628-012-0180-8

ZANIN, A.; DAL MAGRO, C.B.; BUGALHO, D.K.; MORLIN, F.; AFONSO, P.; SZTANDO, A. Driving Sustainability in Dairy Farming from a TBL Perspective: Insights from a Case Study in the West Region of Santa Catarina, Brazil. **Sustainability** v.12 n.15, p.6038, 2020. DOI http://dx.doi.org/10.3390/su12156038

ZHONG, Z.; ZHANG, C.; JIA, F.;BIJMAN, J. Vertical coordination and cooperative member benefits: Case studies of four dairy farmers' cooperatives in China. **Journal of CLeaner Production,** v.172, p.2266-2277, 2018. DOI https://doi.org/10.1016/j.jclepro.2017.11.184