REVISION REPORT

Manuscript ID: MD-06-2023-1034

Title: How have soft lean practices contributed to organizational resilience in the service sector?

Dear Prof. Andrea Runfola,

Thank you for providing us with the opportunity to improve our work. We are pleased to submit our substantially revised manuscript, and a detailed report on improvements made in the text. In our revision, we have carefully considered the reviewers' comments and suggestions. The implemented changes in the manuscript are marked in red. Below, we address each comment and explain the modifications made in the revised manuscript.

In our view, the reviewers' comments were helpful, and we appreciated their constructive feedback. Upon addressing the issues raised, we believe the quality of the paper has significantly improved; we hope you agree with that. The language of the new manuscript was also checked thoroughly.

Best regards,

The authors

Answers to REVIEWER #1:

Overall Comments: Thank you for having me review this article, which deals with an emergent and important topic, i.e., the increasing need for resilience, and an understanding of drivers and barriers of resilience in service operations. The article is generally well written, but fails to entirely convince, as a result of a missing problematization of the need for resilience in service operations; in contrast, too much focus on the benefits of lean practices; a lack of embeddedness in the service operations literature; and a lack of a clear theoretical contribution (i.e., we do not learn much about the mechanism of how lean practices would affect organizational resilience in service operations). Nonetheless, the article appears to present sufficient potential to be developed into a highly interesting contribution to the service operations literature. In my review, I focus on several suggestions to turn various flaws into strengths of the article. I hope my suggestions are helpful, and I wish the authors good luck in further refining the article.

Answer: We appreciate the time devoted by the reviewer and hope to have addressed all remarks below.

R#1 – Comment#1: Although the title suggests that the article focuses on the study of phenomena in the service industry, I am missing a clear positioning of the article in that (service operations) literature. Part of the problem is that there is currently no clear (theoretical) problem identification, and the article, sort of, starts from the assumption/conviction that soft lean management practices have a positive impact on resilience. The article also starts with a discussion of lean management. This almost creates the impression that the practice is being marketed to the reader, and sort of reduces the contribution upfront to 'showing that it does'. My strong suggestion would be to explicitly problematize the issue of resilience in service operations, try to define it in the context of service operations, and then argue (theoretically) how lean practices could address this issue, followed by an empirical investigation. In other words, the problem the article is fundamentally addressing, I believe, is the need for greater resilience, and the quest for 'antecedents' of resilience, or practices that increase resilience (in the service sector). I therefore suggest that, in the introduction, the authors move the paragraph on resilience up, and at the start of the article conceptualize and problematize resilience in service operations, to show the relevance of studying this particular topic, and at the same time choose a clear audience for the article, i.e., indicate for whom the results are interesting. There is quite some emergent literature about the need for resilience in the service sector (most of it is very recent), and service operations management in crises, so this should not be too difficult. This may also help the authors to identify a clearer gap in the literature and embed the article better in existing research about (resilience in) service industries.

R#1 – Answer#1: We thank the reviewer for this observation. Following this suggestion, we have restructured and expanded the introductory section of the revised manuscript. We believe such changes help readers to better understand the problem that is being addressed in the service industry. The revised introductory section now reads as follows:

> *"**1. Introduction***
>
> *The new coronavirus infection (COVID-19) has significantly impacted the health of individuals, organizations, and economies. Representing a significant part of the global economy, the service industry has adopted many measures to keep businesses running despite COVID-19 implications (Tortorella et al., 2021a). For instance, most service organizations required employees to work from home as much as possible, particularly those performing asynchronous work (Graves and Karabayeva, 2020). In addition, organizations shifted their policies to reduce social exposure and risk of contagion in the workplace by redistributing work shifts and redesigning workstations (Qiu et al., 2020; Béland et al., 2020). Such issues raised the importance of service organizations developing abilities to properly cope with disruptive events.*
>
> *Denoted as the ability of an organization to anticipate, prepare for, respond, and adapt to incremental change and sudden disruptions to survive and thrive (Denyer, 2017), organizational resilience has assumed greater urgency in the face of disruptive events such as natural disasters, terrorism, geopolitical and economic trends (Annarelli and Nonino, 2016), and more recently the COVID-19 pandemic. Resilience is necessary for organizations to cope with disruptions,*

leveraging opportunities and delivering the expected performance output. In this sense, organizational resilience requires not only the adoption of strategies and technical approaches to deal with disruptions but also the human-related aspects to support the organization during the absorption, adaptation, and recovery of the disruptive event's implications (Lengnick-Hall et al., 2011; Bouaziz and Smaoui Hachicha, 2018; Mitsakis, 2020).

Lean management has been frequently associated with a set of practices and principles that function as part of the organizational system to continuously improve processes, products, and services in alignment with customers' needs through the active engagement of employees (Womack and Jones, 1994; 1997; 2015). Widely deemed as a socio-technical system (Hadid et al., 2016; Soliman and Saurin, 2017), lean management has been commonly approached by dividing it into two main components: (i) technical and tangible (i.e., hard lean practices), and (ii) social and behavioral (i.e., soft lean practices) (Furlan et al., 2011; Bortolotti et al., 2015). Nevertheless, as most research has emphasized the effects of the former on performance, the understanding of soft lean practices is still underexplored (Januszek et al., 2022). Some researchers (e.g., Emiliani, 1998; 2003) initiated the investigation on the social and behavioural aspects of lean systems, but the relevance of this topic has significantly increased in the past few years (Seidel et al., 2019; Tortorella et al., 2020; Arellano et al., 2021).

Originally conceived in the automotive manufacturing environment, the observed benefits motivated the expansion of lean management implementation beyond car factories, being consistently adopted in other industry sectors, such as construction (Ballard et al., 2007) and service (Ahlstrom, 2004). Specifically in the service industry, which is highly diversified and highly relevant in most countries' economies, lean management implementation has played a strategic role in enhancing competitiveness (LaGanga, 2011; Malmbrandt and Åhlström, 2013; Hadid et al., 2016). However, the occurrence of the COVID-19 pandemic has raised doubts regarding the effectiveness of lean management to cope with severe disruptions due to potential trade-offs with resilience development (Hussain et al., 2022; Alemsan et al., 2022). In fact, the few studies encompassing lean implementation in services during the pandemic (e.g., Tortorella et al., 2021a; Ivanov, 2022) suggested a positive impact on performance, but poorly explored its relationship with resilience. In this vein, the adoption of soft lean practices may play a unique role in supporting organizational resilience. However, evidence of such a relationship is scarce, especially in the service industry, giving rise to the following research questions (RQs):

RQ_1. What is the relationship between soft lean practices implementation and organizational resilience development in the service sector?

RQ_2. How have soft lean practices contributed to organizational resilience in the service sector?

To answer these RQs, we adopted a mixed-methods explanatory design that relied on two sequential and complementary phases. In the first phase, a quantitative analysis was performed based on data collected from practitioners from service organizations, allowing the identification of the significance of this relationship and answering RQ_1. In the second phase, we used data collected from interviews with experts to qualitatively assess how this relationship occurs, addressing RQ_2. Due to the incipient body of knowledge on the subject, no hypotheses were formulated beforehand (Creswell, 2003). This study provides a deeper understanding of the implications of lean management, specifically with regards to the support of soft lean practices to organizational resilience development, which is still underexplored in the literature. Additionally, the identification of this relationship and how it happens allows service organizations to deploy human-related strategies to promote broader adoption of certain soft lean practices. As socio-cultural changes are usually time-consuming, anticipating these organizational resilience needs may result in competitive advantages when in face of disruptive events.

The remainder of this article is structured as follows. Section 2 brings the background on the main concepts involved in this study. Section 3 describes the method employed in our research, whose results are presented and discussed in sections 4 and 5, respectively. Section 6 concludes the paper and indicates future research opportunities."

R#1 – Comment#2: The focus on service industries is also not strongly motivated, there are few theoretical considerations regarding the service industry, service specific challenges, or

service operations, and it does not become clear if and how the findings of the article are specific to this industry. Much of the literature used is actually from manufacturing (NB one of the keywords used is 'lean production'), which is in itself not necessarily a problem, but it needs to be better 'interpreted' for the service context. Currently the only link to service appears to be the data collection. I suggest the author(s) strengthen(s) the theoretical underpinning of the study, by embedding it stronger in the service (operations) literature. Similar to the introduction, I strongly suggest developing the literature review from the need of service organizations to become more resilient, and a definition of resilience in service (which is, in my view different from resilience in manufacturing) towards the potential of soft lean practices to impact the ability of the company to adapt. A theoretical underpinning of why and how soft lean practices would positively affect the resilience of organizations in service industries would then be possible.

R#1 – Answer#2: Thank you very much for the valuable suggestions. To address that, we have added a new section in the literature review entitled "2.1. Service industry", which approaches the characteristics and specific challenges that service organizations have when coping with disruptive events. Please, refer to the revised manuscript to check this new section.

R#1 – Comment#3: The methodology section is in places rather implicit. No descriptive statistics are provided (means, standard deviations, distribution characteristics), neither from independent nor from the dependent variables. It is not clear how resilience has been measured. The constructs are all defined on the level of analysis of the organization, rather than the individual, so please show how the four dependent variables were captured (in a reliable way). The authors refer to the appendix, but that was not included in the file for review. I suggest to provide some information about how they were measured and to provide descriptive statistics.

R#1 - Answer#3: We understand reviewer's concern, and we appreciate the opportunity to clarify this issue. Appendices were initially provided as separate files for review. Now, we have added them at the end of the main document to assure their display. All descriptive statistics have been shown in Appendix C (please, refer to the revised manuscript). Regarding the measurement of resilience, we adopted the measures proposed by included questions about the development level of four resilience abilities proposed by Hollnagel (2017) and utilized by Rosa et al. (2021); they are: monitor, anticipate, respond, and learn. A scale ranging from 1 (not developed) to 5 (fully developed) was utilized to assess that. This was explained in section "3.1.1. Instrument development and data collection", and displayed in Appendix A.

R#1 – Comment#4: Analysis - This part is relatively clear. It may further help to clarify the results by visualizing all (significant) relationships in a model.

R#1 – Answer#4: Thank you for this remark. Table 7 aims to summarize our research findings in a concisive manner.

R#1 – Comment#5: I think it would help to increase the impact of the study, if the authors could conclude the article with clear a clear discussion of the theoretical contributions (NB, conducting an analysis that has not been conducted so far is, as such, not a real contribution to knowledge), followed by theoretical implications (what should researchers do differently, based on the results), as well as a set of actionable practical implications for service operations managers (what should they be doing differently).

R#1 – Answer#5: This is a valid remark. We have expanded the discussion on theoretical implications of our study at the conclusions section of the revised manuscript. The included statements read as follows:

> "(…) *First, in theoretical terms, understanding the implications of lean management (specifically soft lean practices adoption) on organizational resilience in services helps dispel the existing doubts about the trade-offs between these approaches. Our study provides empirical evidence to support a positive relationship between them, specifying how it might be verified. This contradicts the assumptions that lean management may reduce slack in organizational systems, hence, increasing vulnerability to disruptive events. Our findings suggest that the socio-cultural component of lean management establishes a fundamental behavioral basis on which the service industry can develop core resilience abilities. To the best of our knowledge, no previous study has conducted a similar analysis. Hence, we pose this as an original contribution of this work.*
>
> *Second, from a practical standpoint, the identification of the relationship between soft lean practices allows service organizations to more assertively develop human-related strategies, fostering the extensive adoption of specific soft lean practices according to the desired organizational resilience ability. As socio-cultural changes are usually time-consuming, the proper implementation of soft lean practices meets the organizational resilience needs, which can yield competitive advantages in the face of disruptions. In other words, as service organizations realize which abilities must be developed to cope with upcoming disruptive events, they can prioritize the implementation of the corresponding soft lean practices that will support such resilience achievement. Thus, our study offers tangible guidelines for more resilient service organizations based on sociocultural elements of lean management.*"

R#1 – Comment#6: I suggest also discussing the limitations inherent to the chosen approach, which would strengthen the argumentation for the suggestions for further research.

R#1 – Answer#6: Thanks for this comment. We have added some sentences to better clarify our study's limitations and suggest future research opportunities. The revised paragraph reads as follows:

> "(…) *It is also noteworthy some limitations of this research. Although some indications might be extended to other industry sectors and socio-economic contexts, we focused on service organizations in a single country with a limited sample size (n = 106). Thus, to adequately verify how generalizable our findings are, further studies could expand and diversify the context of analysis, enlarging the dataset. Regarding our research methodology, although the mixed-method approach tends to provide a complementary view of the investigated phenomenon, it does not saturate the possibilities for understanding the topic. Other research methods could also be used (e.g., multiple case studies and longitudinal analyses) to provide additional*

information not captured in our investigation. Another limitation concerns the fact that we did not assess how the relationship between soft lean practices and organizational resilience affected the performance of those service organizations. Even though highly resilient service organizations are more likely to perform well during disruptions, we did not offer evidence to bear this assumption. Future studies could approach that, complementing our insights."

Answers to REVIEWER #2:

Overall Comments: The article focuses on the following research question: "How have soft lean practices contributed to organizational resilience in the service sector?". A strength of the article is the use of mixed method explanatory design within a two-phase process which consists in the application of a survey and of semi-structured interviews. Nevertheless, there are several aspects that must be reconsidered

Answer: We appreciate the time devoted by the reviewer and hope to have sufficiently addressed all the remarks below.

R#2 – Comment#1: Limitations of the research methodology. The paper does not state that a major imitation of the survey research (during the first phase) is the small sample size. Also, the article does not provide the necessary information on the representativeness of the sample for the business landscape of India. There is insufficient information on the applied sampling method and on the extent to which authors used a probability or non-probability sampling method.

R#2 – Answer#1: We understand the reviewer's concern, and we appreciate the comment. We have clarified such sample limitation in the revised manuscript, as displayed in **R#1 – Answer#6**. Regarding sample characteristics, Table 2 provides the characteristics of the surveyed organizations. To collect data, a non-random choice of organizations was conducted by defining a few criteria to select respondents. First, due to the context of our study, all respondents should belong to service organizations that have been implementing lean management for a minimum of two years. Second, participants should play either a middle (coordinator or supervisor) or senior (manager or director) leadership role. This leadership position would favor a broader understanding of their organization, mitigating a short-sighted view of the current state. Third, as the adoption level of lean management may be influenced by the socio-economic context (Wiengarten et al., 2015), we solely encompassed organizations located in the same country. As India was one of the most affected countries by the COVID-19 pandemic (The Times of India, 2020) and the service industry corresponds to approximately 53% of its gross domestic product (IBEF, 2021), it offered an adequate scenario for investigating the relationship between soft lean practices and organizational resilience in services. Meeting these criteria would assure the legitimacy of respondents' opinions.

Questionnaires were initially sent via e-mail in October 2022 to 558 service organizations. Two follow-up e-mails were sent to reinforce participation in the survey in November and December 2022, respectively. Thus, we argue that a non-probability sampling method was adopted. To clarify this issue, we added a few sentences in section "3.1.1. Instrument development and data collection" of the revised manuscript.

R#2 – Comment#2: Structure of the article. The Appendices A and B are mentioned in the manuscript, but they are not available.

R#2 – Answer#2: This is a valid remark. Appendices were initially provided as separate files for review. Now, we have added them at the end of the revised main document to assure their display.

R#2 – Comment#3: Implications for further research. The paper does not indicate clearly and presents insufficiently the main directions for further research.

R#2 – Answer#3: We appreciate this comment. As indicated in **R#1 – Answer#6**, we have expanded the discussion on our study's limitations, which give rise for future research opportunities. Hence, we added some sentences at the end of the revised manuscript to clearly indicate those opportunities for future research.

R#2 – Comment#4: Implications for future practice. The manuscript does not provide enough information on the impact of the findings on the future activities of companies from the service sector.

R#2 – Answer#4: We agree with the reviewer. Not only we have expanded the discussion on the theoretical implications of our study, but also its practical contributions. Please, refer to the revised manuscript or to **R#1 – Answer#5** to check these improvements.

Soft lean practices and organizational resilience in the service sector

Abstract

Purpose - This paper examines the relationship between soft lean practices implementation and organizational resilience development in the service sector.

Design/methodology/approach - A mixed-methods explanatory design that relied on two sequential and complementary phases was adopted. In the first phase, a quantitative analysis was performed based on data collected from practitioners from service organizations, allowing the identification of the significance of this relationship. In the second phase, we used semi-structured interviews with experts to qualitatively assess how this relationship occurs.

Findings - Findings indicated that soft lean practices are positively associated with organizational resilience, although the extent of their relationships varies depending on the resilience ability under analysis. Interviews with experts also provided specific details on how such relationship occurs, adding insights to the numerical results.

Originality/value - This study provides a deeper understanding of the implications of lean management, specifically concerning the support of soft lean practices to develop organizational resilience. Additionally, the identification of this relationship (and how it occurs) allows service organizations to deploy human-related strategies to promote broader adoption of certain soft lean practices. As socio-cultural changes are usually time-consuming, anticipating these organizational resilience needs may result in competitive advantages when in face of disruptive events.

Keywords: Lean production, Resilience, Soft lean practices, Mixed-method research.

1. Introduction

The new coronavirus infection (COVID-19) has significantly impacted the health of individuals, organizations, and economies. Representing a significant part of the global economy, the service industry has adopted many measures to keep businesses running despite COVID-19 implications (Tortorella et al., 2021a). For instance, most service organizations required employees to work from home as much as possible, particularly those performing asynchronous work (Graves and Karabayeva, 2020). In addition, organizations shifted their policies to reduce social exposure and risk of contagion in the workplace by redistributing work shifts and redesigning workstations (Qiu et al., 2020; Béland et al., 2020). Such issues raised the importance of service organizations developing abilities to properly cope with disruptive events.

Denoted as the ability of an organization to anticipate, prepare for, respond, and adapt to incremental change and sudden disruptions to survive and thrive (Denyer, 2017), organizational resilience has assumed greater urgency in the face of disruptive events such as natural disasters, terrorism, geopolitical and economic trends (Annarelli and Nonino, 2016), and more recently the COVID-19 pandemic. Resilience is necessary for organizations to cope with disruptions, leveraging opportunities and delivering the expected performance output. In this sense, organizational resilience requires not only the adoption of strategies and technical approaches to deal with disruptions but also the human-related aspects to support the organization during the absorption, adaptation, and recovery of the disruptive event's implications (Lengnick-Hall et al., 2011; Bouaziz and Smaoui Hachicha, 2018; Mitsakis, 2020).

Lean management has been frequently associated with a set of practices and principles that function as part of the organizational system to continuously improve processes, products, and services in alignment with customers' needs through the active engagement of employees

(Womack and Jones, 1994; 1997; 2015). Widely deemed as a socio-technical system (Hadid et al., 2016; Soliman and Saurin, 2017), lean management has been commonly approached by dividing it into two main components: (*i*) technical and tangible (i.e., hard lean practices), and (*ii*) social and behavioral (i.e., soft lean practices) (Furlan et al., 2011; Bortolotti et al., 2015). Nevertheless, as most research has emphasized the effects of the former on performance, the understanding of soft lean practices is still underexplored (Januszek et al., 2022). Some researchers (e.g., Emiliani, 1998; 2003) initiated the investigation on the social and behavioural aspects of lean systems, but the relevance of this topic has significantly increased in the past few years (Seidel et al., 2019; Tortorella et al., 2020; Arellano et al., 2021).

Originally conceived in the automotive manufacturing environment, the observed benefits motivated the expansion of lean management implementation beyond car factories, being consistently adopted in other industry sectors, such as construction (Ballard et al., 2007) and service (Ahlstrom, 2004). Specifically in the service industry, which is highly diversified and highly relevant in most countries' economies, lean management implementation has played a strategic role in enhancing competitiveness (LaGanga, 2011; Malmbrandt and Åhlström, 2013; Hadid et al., 2016). However, the occurrence of the COVID-19 pandemic has raised doubts regarding the effectiveness of lean management to cope with severe disruptions due to potential trade-offs with resilience development (Hussain et al., 2022; Alemsan et al., 2022). In fact, the few studies encompassing lean implementation in services during the pandemic (e.g., Tortorella et al., 2021a; Ivanov, 2022) suggested a positive impact on performance, but poorly explored its relationship with resilience. In this vein, the adoption of soft lean practices may play a unique role in supporting organizational resilience. However, evidence of such a relationship is scarce, especially in the service industry, giving rise to the following research questions (RQs):

RQ_1. What is the relationship between soft lean practices implementation and organizational resilience development in the service sector?

RQ_2. How have soft lean practices contributed to organizational resilience in the service sector?

To answer these RQs, we adopted a mixed-methods explanatory design that relied on two sequential and complementary phases. In the first phase, a quantitative analysis was performed based on data collected from practitioners from service organizations, allowing the identification of the significance of this relationship and answering RQ_1. In the second phase, we used data collected from interviews with experts to qualitatively assess how this relationship occurs, addressing RQ_2. Due to the incipient body of knowledge on the subject, no hypotheses were formulated beforehand (Creswell, 2003). This study provides a deeper understanding of the implications of lean management, specifically with regards to the support of soft lean practices to organizational resilience development, which is still underexplored in the literature. Additionally, the identification of this relationship and how it happens allows service organizations to deploy human-related strategies to promote broader adoption of certain soft lean practices. As socio-cultural changes are usually time-consuming, anticipating these organizational resilience needs may result in competitive advantages when in face of disruptive events.

The remainder of this article is structured as follows. Section 2 brings the background on the main concepts involved in this study. Section 3 describes the method employed in our research, whose results are presented and discussed in sections 4 and 5, respectively. Section 6 concludes the paper and indicates future research opportunities.

2. Background

2.1. Service industry

The service industry sector plays an important role in a functioning society and economy. Being composed by many different fields, the service industry covers all economic activities whose product is not a physical or manufactured good (Landrum and Prybutok, 2004). Generally, a service is consumed when it is produced and provides added value in forms that essentially represent intangible benefits to customers (either external or internal to the company). The growing importance of services to the economy of countries began from the mid-twentieth century (Lee and Shin, 2018). Such growth has been evidenced by the participation of the service sector in the occupation of labor and the generation of wealth, which are reflected by the Gross Domestic Product (GDP). In addition to being responsible for the largest portion of world GDP, the service sector presents itself as the most dynamic portion of the economy, given its high growth rates in the number of jobs in the sector (Belhadi et al., 2021).

The management of service operations is a constant challenge, as the organization's objectives, customer needs, and attention to service suppliers must all be managed simultaneously in a constantly changing environment (Yee et al., 2010; Kohtamäki et al., 2019). While on the one hand, products have added a growing number of services as a way of establishing competitive differentials; on the other hand, services have, to varying degrees, incorporated material goods in their installment. The synergy between goods and services to varying degrees is called continuum of goods and services, in which at one end would be pure services and in another pure goods (Martinez et al., 2017). There are some characteristics that make the management and operationalization of services clearly different from manufacturing processes; they are: (*i*) intangibility, (*ii*) client participation, (*iii*) perishable, (*iv*) heterogeneity, and (*v*) simultaneity (Cusumano et al., 2015).

First, the fact that services are relatively intangible makes it harder for companies and customers to evaluate their outcome and quality (Gomber et al., 2018). Although there are

exceptions, services are difficult to standardize, increasing management complexity. Second, the client is the element that usually triggers the operation, specifying when and how it should be performed. Thus, due to the need for the client's presence, the time and cost of customer displacement to the facilities, or vice versa, are considered in the economic decision of the company's location (Vargo and Lusch, 2017). Perishable is related to the fact that services are not subject to "storage". In other words, if the ability of a service is not used at a given time it is lost, not allowing the creation of service inventory. This feature implies a major challenge to capacity management and service demand (Kohtamäki et al., 2019). The combination of intangible and inseparable characteristics results in the heterogeneity of the service provided. However, customer interaction enables a more satisfactory experience, as service activity is usually oriented to people and not for things. Exceptions are found in services that process information, for example, which have limited contact with the customer by introducing self-service technology (Voorhees et al., 2017). Finally, the simultaneity between production and service consumption makes it impossible to storage, aggravating the difficulty of efficient use of service capacity. This imposes the need for flexibility for absorbing volume variation in service operations (Kasiri et al., 2017). Overall, these specific characteristics undermine service management during disruptive events, raising the importance of finding more adequate ways for doing so.

2.2. Lean in services

Although the lean management paradigm was widely deemed in the manufacturing sector (Krafcik, 1988; Womack et al., 1990), it rapidly expanded to other industries, suffering adaptations required to assure the applicability of its principles and practices (Bowen and Youngdahl, 1998; Ahlstrom, 2004; Bicheno, 2008). Particularly in the service industry, these adaptations also had to consider the different types of service organizations (Suarez-Barraza et

al., 2012; Alsmadi et al., 2012; Hadid et al., 2016), as their intricacies and economic relevance may significantly vary. Despite that, evidence of the benefits of lean implementation in services is prolific (e.g., Hadid and Mansouri, 2014; Ojasalo and Ojasalo, 2018; Cavdur et al., 2019).

Due to service diversity, identifying the lean implementation readiness in services is not an easy task, and many researchers (e.g., Malmbrandt and Åhlström, 2013; Gupta and Sharma, 2018) have developed different assessment methods to guide it. Most of these methods differentiated the sociocultural and technical aspects of lean management to help structure its implementation, approaching them either concomitantly or separately. For example, Bicheno (2008) and Song et al. (2009) focused on the technical aspects of lean management implementation in services, while Tortorella et al. (2020) solely approached the sociocultural aspects (e.g., leadership behaviors) related to a successful implementation in hospitals. In turn, Gupta and Sharma (2018) combined both aspects into a framework to systematically guide lean management implementation in services.

Overall, lean management implementation in service organizations presents specific barriers due to some inherent characteristics of services, such as the impossibility of stocking services and non-tangible features (LaGanga, 2011; Arfmann and Barbe, 2014; Sunder M et al., 2018; Fenner and Netland, 2023). Therefore, the service industry offers a challenging context to lean management whose implications for organizational resilience are still underexplored, justifying our research motivation.

2.3. Soft lean practices

Soft lean practices refer to the human-related components (e.g., people and their relationships) of lean management, being fundamental to fully obtain its benefits in the long run (Bortolotti et al., 2015). In addition, according to the socio-technical view of lean management (Shah and

Ward, 2007), the effect of hard lean practices, represented by the technical and analytical aspects of lean management, on performance may be boosted when they are coherently accompanied by soft lean practices (Furlan et al., 2011; Mamat et al., 2015; Januszek et al., 2022). However, the role played by soft lean practices has been underestimated (Larteb et al., 2015; Lista et al., 2022) and, only recently, researchers and practitioners have adequately regarded it. In this sense, much of their effects on different organizational settings and aspects may still be unknown.

The categorization of soft lean practices also varies in the literature. For instance, Shah and Ward (2003) proposed the socially oriented construct of practices called human resources management. Then, they expanded it and represented these practices by a different set of constructs, such as involved employees and customers, and suppliers partnership (Shah and Ward, 2007). In the same vein, Bortolotti et al. (2015) suggested the existence of six constructs of soft lean practices: (*i*) top management leadership for quality, (*ii*) supplier partnership, (*iii*) small group problem solving, (*iv*) continuous improvement, (*v*) training employees, and (*vi*) customer involvement. More recently, Januszek et al. (2022) offered a complementary view of soft lean practices based on their association with the management of the social system, grouping them into six constructs, as shown in Table 1.

Table 1 – List of soft lean practices (adapted from Januszek et al., 2022)

2.4. Organizational resilience

Resilient organizations are the ones that rebound and thrive when in the face of a disruptive event, being able to absorb the implications of the disruption and adapt their products, processes, and services toward the recovery of the normal (or even better) operating

performance (Annarelli and Nonino, 2016; Denyer, 2017). Resilience helps organizations to continuously handle and reduce the impacts of disruptions amid a changing environment. For that, organizations must install a well-connected, collaborative, and creative work environment that promotes competitiveness and prosperity (Bouaziz and Smaoui Hachicha, 2018; Mitsakis, 2020). However, building a resilient organization is a long-term process that requires a systems mindset emphasizing agility, psychological safety, adaptable leadership, and cohesive culture (Robb, 2003; Duchek, 2020).

Although there is an agreement on what organizational resilience means, researchers may differ with regards to the set of abilities or mechanisms that promote it. Concepts related to organizational readiness, response, flexibility, velocity, visibility, and collaboration (Briano et al., 2009; Jüttner and Maklan, 2011; Cotta and Salvador, 2020) are commonly found in the organizational resilience literature. More specifically, Hosseini et al. (2019), based on the concepts from Biringer et al. (2013), conceptualized three abilities that have sequential roles in the development of organizational resilience: (*i*) absorptive, (*ii*) adaptive, and (*iii*) restorative. Complementarily, Hollnagel (2017) proposed four inter-related abilities widely acknowledged by researchers; they are:

i) Monitor: refers to knowing what to search, focusing on what is critical or might become an issue in the short term;

ii) Anticipate: corresponds to knowing what to expect, identifying threats and opportunities, potential changes, disruptions, pressures, and their implications;

iii) Respond: indicates knowing what to do, dealing with disruptions and disturbances either by implementing a prepared set of responses or by adjusting normal functioning; and

iv) Learn: represents the understanding of what has happened from successes as well as failures, addressing the facts to learn the appropriate lessons from the corresponding experience.

The association between organizational resilience and human-related practices has also been emphasized in previous studies (e.g., Lengnick-Hall et al., 2011; Bouaziz and Smaoui Hachicha, 2018; Mitsakis, 2020), which suggested that these practices pave the way to resilience development. However, such association is not always direct or easily identifiable, since the behavioral changes promoted by these practices are often observed in the long term (Do et al., 2022; Gerschberger et al., 2023). This undermines the achievement of conclusive indications about such a relationship, especially when it involves practices that intrinsically foster innovation and continuous improvement, such as soft lean practices.

3. Method

To answer both RQs, we conducted a mixed-methods exploratory research. Through the sequential combination of two main research phases, we identified trends and details of the relationship between soft lean practices and organizational resilience. The mixed-methods exploratory design comprised the gathering and analysis of both quantitative and qualitative data within the same study (Creswell et al., 2003; Creswell, 2005). This is a recommended approach to deeply understand the phenomenon of interest and produce generalizable indications (Ivankova et al., 2006). Previous studies in social sciences also adopted similar research designs (e.g., Saurin et al., 2020; Sony et al., 2022; Tortorella et al., 2023). The research phases are detailed in the following sections.

3.1. Phase 1 – Quantitative analysis

In the first phase, we explored the relationship between soft lean practices adoption and organizational resilience development (RQ_1) by conducting an online survey-based study with practitioners from service organizations. Quantification of empirical data based on the opinions and perceptions of legitimate respondents is quite common, as it allows a high level of representativeness at a lower cost (Van Selm and Jankowski, 2006; Montgomery, 2013). This phase comprised four steps described next.

3.1.1. Instrument development and data collection

The applied questionnaire had three main parts (see Appendix A). In the beginning, we collected information about respondents and their respective organizations. Then, we asked respondents about the adoption level of the soft lean practices (listed in Table 1) in their organizations. A five-point scale was used varying from 1 (not adopted) to 5 (fully adopted). Finally, the third part included questions about the development level of four resilience abilities proposed by Hollnagel (2017) and utilized by Rosa et al. (2021); they are: monitor, anticipate, respond, and learn. A scale ranging from 1 (not developed) to 5 (fully developed) was utilized to assess that. Three experts (two academics and one practitioner) were asked to assess the questionnaire in terms of its face and content validity (Kothari, 2004). Minor suggestions were made to clarify some of the surveyed items.

To collect data, a non-probability sampling method was adopted. A non-random choice of organizations was conducted by defining a few criteria to select respondents. First, due to the context of our study, all respondents should belong to service organizations that have been implementing lean management for a minimum of two years. Second, participants should play either a middle (coordinator or supervisor) or senior (manager or director) leadership role. This leadership position would favor a broader understanding of their organization, mitigating a

short-sighted view of the current state. Third, as the adoption level of lean management may be influenced by the socio-economic context (Wiengarten et al., 2015), we solely encompassed organizations located in the same country. As India was one of the most affected countries by the COVID-19 pandemic (The Times of India, 2020) and the service industry corresponds to approximately 53% of its gross domestic product (IBEF, 2021), it offered an adequate scenario for investigating the relationship between soft lean practices and organizational resilience in services. Meeting these criteria would assure the legitimacy of respondents' opinions.

Questionnaires were initially sent via e-mail in October 2022 to 558 service organizations. Two follow-up e-mails were sent to reinforce participation in the survey in November and December 2022, respectively. The final sample consisted of 106 organizations and their characteristics are displayed in Table 2.

Table 2 – Characteristics of organizations (n = 106)

3.1.2. Bias countermeasures

The utilization of psychometric scales to verify respondent's perceptions is subject to certain types of bias. Hence, we performed a set of countermeasures to mitigate this issue and assure the validity of our instrument and the collected data. We located the parts of the questionnaire far apart from each other (Podsakoff and Organ, 1986). Additionally, initial statements informing participants about the anonymity and confidentiality of the investigation and the absence of right or wrong responses were included (Podsakoff et al., 2003). Then, to verify non-response bias between early (n_1 = 62) and late (n_2 = 44) respondents, we utilized Levene's test for equality of variances and a t-test for equality of means (Armstrong and Overton, 1977). Differences in means and variances between groups were not significant. Lastly, we used

Harman's single-factor test with an exploratory factor analysis to verify common method bias (Malhotra et al., 2006). The test encompassing all variables (soft lean practices and resilience abilities) yielded a first factor that accounted for 35.21% of the total variance. Because no single factor explained most of the variance (i.e., > 50%; Hair et al., 2014), common method bias issues were disregarded.

3.1.3. Measures, construct validity and reliability

Measures for soft lean practices, regarded as independent variables in our study, were devised based on Januszek et al. (2022), which proposed six multi-item, interrelated constructs. Hence, we checked the validity and reliability of the latent constructs obtained from responses by running a confirmatory factor analysis (CFA) using STATA 14.2. Individual CFA models were established for each construct, whose items presented satisfactory factor loadings (i.e., > 0.45; Tabachnick and Fidell, 2007). Goodness-of-fit of each model was then verified using the cut-off values suggested by Hu and Bentler (1999) and Hair et al. (2014). As displayed in Table 3, values for comparative fit index (CFI) were below 0.95, standardized root mean squared residual (SRMR) were lower than 0.08, Cronbach's alpha were greater than 0.60, and constructs' composite reliability (CR) were greater than 0.7. Results of the χ^2 test were smaller than 3 (χ^2/df). We also determined the average variance extracted (AVE) to test discriminant validity. AVE values were all greater than 0.50 and exceeded the squared correlation coefficients obtained from the construct scores (see Table 4) (Fornell and Larcker, 1981; Bagozzi and Yi, 1988). Hence, requirements for both convergent and discriminant validity of the six constructs of soft lean practices were satisfied. Values for each construct (given on a continuous scale) were determined using their corresponding factor loadings as weights, which were then normalized to avoid scale effects (Kothari, 2004).

As we sought to individually assess the four organizational resilience abilities (dependent variables), they were not bundled into a construct but used as separate measures. Cronbach's alpha values for each ability were all larger than 0.60 (Hair et al., 2014), ensuring reliability of responses. Finally, as control variables, we utilized the service organizations' characteristics (sector, ownership, size, type, degree of interaction and customization, and degree of labor intensity). All control variables were dichotomized, except for organization sector, which was considered a categorical variable that varied in five levels (see Table 2).

Table 3 – CFA on soft lean practices

Table 4 – Pearson correlation coefficients

3.1.4. Quantitative data analysis

To examine the significance of the relationship between soft lean practices and organizational resilience abilities, we performed a set of ordinary least square hierarchical regression models. Two models were determined for each dependent variable. In the first model, organizational resilience abilities were regressed on the control variables. Because organization type and ownership were not significant in any of those models and results remained unchanged even when they were removed, these control variables were excluded from the regression models to enhance degrees of freedom. Previous studies that used several control variables (e.g., Marodin et al., 2016; Narayanamurthy and Tortorella, 2021) adopted a similar procedure in their regression analyses. Then, in the second model, we included in the regression analyses the control and independent (constructs of soft lean practices) variables. Results for F-value, R^2,

and change in R^2 were compared and used as criteria to identify the best model for each organizational resilience ability in the regression analyses.

Variance inflation factors (VIF) were calculated to check for multicollinearity of the estimated coefficients. All VIF values were below 5, suggesting that multicollinearity was not an issue (Belsley et al., 2005). Conditions for OLS regression analyses were also checked by examining normality, linearity, and homoscedasticity (Hair et al., 2014). These tests provided evidence that all requirements for the analyses were properly met. Lastly, it is important to mention that our sample size (n = 106) resulted in a ratio of 10.6 responses per variable (the most critical model had ten variables), exceeding the recommendations from Concato et al. (1995), Peduzzi et al. (1995), and Vittinghoff and McCulloch (2007). This reinforced the adequacy of our dataset for the regression models to be carried out.

3.2. Phase 2 – Qualitative analysis

The second phase of the study consisted of qualitatively assessing "how" soft lean practices can contribute to organizational resilience in the service industry (RQ_2). For that, we carried out semi-structured interviews with experts, whose data was then coded and analyzed. This phase helped refine and explain the relationships found statistically significant in the previous phase (Creswell et al., 2003; Ivankova et al., 2006). The steps of this phase are detailed below.

3.2.1. Interviewees' selection

To allow proper generalization of concepts, we invited experienced academics who also presented practical experience with lean management implementation, particularly in services context. Fourteen experts with at least ten years of both practical and research experience in lean management (see Table 5) participated in the interviews. The background of experts varied

between Industrial Engineering and Business Management, which are two fields traditionally interested in lean management implementation. Based on the indications from Guest et al. (2006), Fugard and Potts (2015), Braun and Clarke (2016), and Boddy (2016), our number of interviewees exceeded the minimum required (twelve interviewees) for achieving qualitative data saturation. We advised all interviewees that participation was voluntary and anonymous using a consent form and a plain language statement.

Table 5 – Characteristics of the experts

3.2.2. Semi-structured interviews

Interviews were carried out online in January 2023 using the protocol displayed in Appendix B. Open-ended questions were organized into two main parts: (*i*) experts' background and work experience, and (*ii*) opinions about how soft lean practices can support the development of organizational resilience abilities in service organizations. Experts were asked to justify their answers using examples. Interviews lasted between 25 and 40 minutes, and were audio-recorded. Information from previous interviews was not inputted into subsequent ones (Guest et al., 2017). The majority of interviews were led by two of the authors to enhance the reliability and handling of information (Dubé and Paré, 2003). We did not consider idiosyncratic responses so that we could focus on the prevailing patterns in the collected information.

3.2.3. Content analysis

In this step, we transcribed and assessed the collected data using qualitative content analysis. For that, we first categorized, tagged, and combined answers from experts (Mayring, 2004), which allowed the identification of recurring communication patterns (Bell et al., 2018). This

led to the observation of latent interpretations and meanings (White and Marsh, 2006). We manually coded excerpts from the transcripts to verify topics and their relationships (Hsieh and Shannon, 2005), which we categorized to facilitate the organization of data. Narratives on how soft lean practices can support the development of organizational resilience were organized according to the ability of (*i*) monitoring, (*ii*) anticipating, (*iii*) responding, and (*iv*) learning from disruptions. Two authors independently analyzed the content of interviews, and a third one reconciled results to assure consensus and consistency (Tlapa et al., 2022).

4. Results

4.1. Quantitative results

Table 6 shows the standardized $\hat{\beta}$ coefficients for the regression analyses. All regression models were significant. For the development of the monitoring ability, Model 1B (F-value = 18.895; R^2 = 0.274) presented higher prediction capacity, as the change in R^2 from Model 1A was significant (p-value < 0.01). In this model, work standardization ($\hat{\beta}$ = 0.185; p-value < 0.10), visualization ($\hat{\beta}$ = 0.264; p-value < 0.01), and performance measurement ($\hat{\beta}$ = 0.278; p-value < 0.01) were positively associated with monitoring ability. No significant associations were found for the remaining variables. Similarly for anticipation, Model 2B presented a significant higher prediction capacity (F-value = 15.002; R^2 = 0.256). Three constructs of soft lean practices displayed positive significant association with this organizational resilience ability; they are: employee empowerment ($\hat{\beta}$ = 0.168; p-value < 0.10), visualization ($\hat{\beta}$ = 0.234; p-value < 0.05), and performance measurement ($\hat{\beta}$ = 0.218; p-value < 0.05). For the responding ability, Model 3B was selected due to a significant change in R^2 (0.296; p-value < 0.01). Soft lean practices embedded into employee empowerment ($\hat{\beta}$ = 0.306; p-value < 0.01), training ($\hat{\beta}$ = 0.239; p-value < 0.01), work standardization ($\hat{\beta}$ = 0.221; p-value < 0.05), and goal setting (

$\hat{\beta}$ = 0.175; *p*-value < 0.10) seem to positively impact the development level of this organizational resilience ability. Finally, for explaining the variation in the learning ability, Model 4B (*F*-value = 24.012; *p*-value < 0.01; R^2 = 0.358) was selected. Differently from previous organizational resilience abilities, all soft lean practices constructs appeared to positively affect the development level of learning, but no control variable was significant in this model.

Table 6 – Standardized $\hat{\beta}$ coefficients for the regression analyses

4.2. Qualitative results

The interviews with experts raised complementary aspects on "how" soft lean practices support the development of organizational resilience. Particularly, when *monitoring* ability is considered, experts suggested that organizations that adopt practices that allow better visualization and understanding of the work environment and its processes tend to be more aware of potential disruptions. Such awareness level becomes even more evident when business processes' performance is constantly displayed and tracked. They also mentioned that high levels of work standardization help to easily identify abnormalities in service organizations, as highlighted by expert C:

> "*High levels of standardization allow the easy identification of deviations from expected operating conditions. If truly embedded into service organizations' routine, work standards help increase the ability to monitor disruptions.*"

Analogously, experts indicated that soft lean practices such as visualization and performance measurement might favor the organization's ability to *anticipate* disruptions, pressures, and their implications. As expert F said:

> "*Service organizations that visualize and manage the status quo usually present a healthier work environment, where people communicate and are not afraid to discuss their problems. This generates empathy and helps anticipate potential issues.*"

Moreover, they mentioned that organizations that encourage employees to actively participate in continuous improvement activities might know what to expect better, as they are constantly asking for employees' opinions and promoting an open dialogue. This mitigates the occurrence of unexpected issues by increasing transparency within the service organization.

Regarding *respond*, interviewees emphasized the role played by soft lean practices that enhance problem-solving through employees' creativity and participation. Experts A, H, and K, for instance, raised that employees who work in cross-functional teams tend to devise holistic solutions rather than narrow ones. This also yields less resistance when implementing solutions, resulting in quicker and more assertive responses to disruptions. Another important aspect to reduce employees' resistance for new solutions and more quickly react to disruptions is the alignment of goals within the service organization. Experts B, J and N mentioned that when goals are clear, employees tend to better understand the need for change and more easily embrace new approaches, expediting the adaptation of the organization. The role of work standardization for a faster response was also mentioned, as it generates a common ground on which new solutions can be developed. Expert M commented:

> "*When work is highly standardized, employees do not waste time thinking about solutions to obvious problems. Work standards were already developed for those. Employees' creativity should be dedicated to address critical problems that go beyond normal operating conditions.*"

For *learning* ability, experts suggested that adopting soft lean practices generally supports the development of a work environment where the acquired knowledge from dealing with past disruptions is consolidated and widely shared. As soft lean practices, such as employee empowerment, training, and visualization, tend to increase openness and collaboration within the organization, employees learn from past failures and proactively develop solutions incorporating such knowledge. Additionally, some service organizations still struggle with storing lessons learned. Thus, work standardization may be helpful to register successful experiences, assuring learning continuity. Finally, the contributions of goal setting and performance measurement practices were mainly related to the plan-do-check-act (PDCA) process. While goal setting may refer to the planning stage, which often relies on the assessment of previous initiatives, performance measurement is intrinsically related to the check and act stages, enabling employees to verify how effective the responses were and whether there is a need for further development. Expert G exemplified:

> "*Due to the diversity of service organizations, learning ability may not be equally reinforced across al departments. The adoption of soft lean practices offers a natural condition for learning to emerge, as employees are encouraged to plan and implement solutions, and, if successful, standardize and share their experiences. The behaviors fostered by soft lean practices generate a favorable work environment for learning.*"

5. Discussion

We now discuss our findings, summarized in Table 7, in light of the existing body of knowledge. All constructs of soft lean practices were claimed to present positive relationships

with organizational resilience development, although their extent varied across different abilities.

Soft lean practices embedded into *employee empowerment* seem to particularly contribute to the development of anticipation, response, and learning. These practices promote an active engagement of employees in continuous improvement activities (Marin-Garcia and Bonavia, 2015), increasing communication and transparency in relationships and, hence, allowing service organizations to identify threats and opportunities more easily. This outcome somewhat converges with Bouaziz and Smaoui Hachicha's (2018) indications, which reinforced the importance of communication to develop organizational resilience. At the same time, employee empowerment encourages working in cross-functional teams. Although Hofmann (2015) suggested that using cross-functional teams may raise additional challenges for a quicker decision-making, the combination of employees with different backgrounds and skills allows a broader understanding of the problems faced (Furlan et al., 2011; Lengnick-Hall et al., 2011). This yields the development of systemic solutions that help respond more effectively to disruptions. The adoption of a suggestion program also supports a more collaborative work environment where employees share their experiences and learn from each other (Brunet et al., 2003; Tortorella et al., 2021b), hence, contributing to the learning ability of the service organization.

Training practices were found to mainly support the development of both responding and learning abilities. Employees who undergo cross-functional training tend to better understand the intricacies of every process (Chen and Tseng, 2012), increasesing their empathy for existing difficulties. This leads to less resistance when new solutions are implemented to cope with disruptions, allowing faster and more assertive organizational responses. Alsheyadi and Albalushi (2020) pointed out a similar effect and suggested that cross-functional training mediates the effect of empathy. Such cross-functionality-based empathy also implies more

openness in the work environment as employees might be more comfortable sharing lessons learned and incorporating them into existing practices. Thus, we claim the ability to learn from past failures and success in service organizations is positively affected by training practices, which is relatively aligned with indications from Tax and Brown (1998), Gebauer et al. (2012), and Oliveira et al. (2016).

Work standardization supports organizational resilience development in service organizations through three main ways: (*i*) functioning as a reference for problems identification and, hence, increasing monitoring ability; (*ii*) generating a common ground on which new solutions can be developed to respond to disruptions; and (*iii*) registering successful initiatives to support learning ability. While (*i*) and (*iii*) have been widely emphasized in the lean literature (e.g., Lantz et al., 2015; Liker and Ross, 2017; Tortorella and Fettermann, 2018), the role played in (*ii*) has been less frequently mentioned. This role is associated with the paradoxical benefit suggested by Spear and Bowen (1999) and Spear (2008), which claimed that flexibility and creativity in developing new solutions stem from high levels of standardization. In other words, work standardization aims to address problems that occur regularly by developing procedures that avoid the generation of random trial-and-error initiatives. By doing so, employees may devote their creativity and time to work on solutions to problems that go beyond ordinary causes, such as disruptive events. Therefore, work standardization not only contributes to the abilities of monitoring and learning, but also to respond.

Visualization practices are crucial to develop monitoring, anticipation, and learning in service organizations. First, clear visualization and understanding of the work environment help monitor the occurrence of disruptions. This argument is coherent with the indications from Dixit et al. (2020), who evidenced how the installation of visual dashboards enhanced situation awareness of COVID-19 telehealth initiatives at a multihospital healthcare system. Second, an extensive visualization offers employees conditions to better understand the *status quo* and set

a more realistic expectation (i.e., anticipate). Although some authors (e.g., Langstrand and Elg, 2012; Drotz and Poksinska, 2014; Tezel et al., 2016) advised that improper use of visualization may have negative implications on employees' behaviors as it unnecessarily exposes mistakes and failures, our findings suggested that a clearer performance visualization encourages a more collaborative work environment and generates empathy within the organization. This also favors the development of the learning ability in the service organization.

Regarding *goal setting* practices, their adoption seems to influence the development of the responding and learning abilities in service organizations. The establishment of clear goals requires employees to acknowledge the current state of the organization and develop a shared expectation, assuring the concentration of efforts towards the same direction (Bhamu and Singh Sangwan, 2014; Bortolotti et al., 2015; Galeazzo et al., 2017). These practices allow to better understand the need for change, expediting the adaptation of the organization as employees more easily embrace new approaches, especially when responding to disruptions. Additionally, the process of setting goals usually involves the analysis of previous initiatives, and planning and deployment of strategies that support the achievement of such goals (Tortorella et al., 2019). Therefore, learning ability is also benefitted by this process.

Finally, *performance measurement* was found to contribute to the development of the monitoring ability as constant display and track of performance raises awareness of employees in the organization, which intrinsically helps realize what might become an issue in the short term. This also implies a lesser aversion to discussing problems, resulting in more prompt anticipation of potential disruptions. Much has been discussed about performance measurement in organizations, and one of the research streams has been questioning the extent to which it favors the work environment. Among the main arguments, some researchers (e.g., Bazerman, 1982; Saunila, 2017; Grabner et al., 2022) raised attention that an extensive performance measurement might lead to an excess of control, limiting the creative process

inherent to innovation and continuous improvement. Our findings do not bear that. In fact, we claim that these practices enable employees to verify how effective responses were in coping with disruptions and whether there is the need for further developments. Performance measurement might function as a means to conducting the reflection process, a.k.a. *hansei* in the Toyota Production System (Liker and Morgan, 2006; Liker and Ross, 2017); hence, supporting learning in service organizations.

Table 7 – Summary of research findings

6. Conclusions

This study investigated the relationship between soft lean practices implementation and organizational resilience development in the service sector. A mixed-methods explanatory research was carried out, raising complementary findings and valuable contributions to the theory and practice on lean management and organizational resilience.

First, in theoretical terms, understanding the implications of lean management (specifically soft lean practices adoption) on organizational resilience in services helps dispel the existing doubts about the trade-offs between these approaches. Our study provides empirical evidence to support a positive relationship between them, specifying how it might be verified. This contradicts the assumptions that lean management may reduce slack in organizational systems, hence, increasing vulnerability to disruptive events. Our findings suggest that the socio-cultural component of lean management establishes a fundamental behavioral basis on which the service industry can develop core resilience abilities. To the best of our knowledge, no previous study has conducted a similar analysis. Hence, we pose this as an original contribution of this work.

Second, from a practical standpoint, the identification of the relationship between soft lean practices allows service organizations to more assertively develop human-related strategies, fostering the extensive adoption of specific soft lean practices according to the desired organizational resilience ability. As socio-cultural changes are usually time-consuming, the proper implementation of soft lean practices meets the organizational resilience needs, which can yield competitive advantages in the face of disruptions. In other words, as service organizations realize which abilities must be developed to cope with upcoming disruptive events, they can prioritize the implementation of the corresponding soft lean practices that will support such resilience achievement. Thus, our study offers tangible guidelines for more resilient service organizations based on sociocultural elements of lean management.

It is also noteworthy some limitations of this research. Although some indications might be extended to other industry sectors and socio-economic contexts, we focused on service organizations in a single country with a limited sample size (n = 106). Thus, to adequately verify how generalizable our findings are, further studies could expand and diversify the context of analysis, enlarging the dataset. Regarding our research methodology, although the mixed-method approach tends to provide a complementary view of the investigated phenomenon, it does not saturate the possibilities for understanding the topic. Other research methods could also be used (e.g., multiple case studies and longitudinal analyses) to provide additional information not captured in our investigation. Another limitation concerns the fact that we did not assess how the relationship between soft lean practices and organizational resilience affected the performance of those service organizations. Even though highly resilient service organizations are more likely to perform well during disruptions, we did not offer evidence to bear this assumption. Future studies could approach that, complementing our insights.

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Appendix A – Questionnaire

1. Please, fill below the information about you and your organization:

a) Organization size: ( ) ≤ 5,000 employees ( ) > 5,000 employees

b) Organization ownership: ( ) Public ( ) Private

c) Degree of labor intensity: ( ) Low ( ) High

d) Degree of interaction and customization: ( ) Low ( ) High

e) Organization sector: ( ) Business services (e.g,. consulting, auditing, advertising, waste disposal)
( ) Financial services (e.g., financing, leasing, insurance)
( ) Government services (e.g., military, education, judicial, police and fire protection)
( ) Distribution services (e.g., wholesaling, retailing, repairing)
( ) Personal services (e.g., healthcare, restaurants, hotels)
( ) Infrastructure services (e.g., communications, transportation, utilities, banking)

f) Your gender: ( ) Male ( ) Female

g) Your work experience: ( ) ≤ 5 years ( ) > 5 years

h) Your role: ( ) Supervisor or Coordinator ( ) Manager or Director

2. Please, indicate below the adoption level of the following practices in your organization:

Scale: from 1 (not adopted) to 5 (fully adopted)

Practice	1	2	3	4	5
Employees are encouraged to actively drive suggestion programs					
Our organization forms cross-functional project teams to solve problems					
We have implemented tools and methods to deploy a continuous improvement process					
Each of our employees within our work teams is cross trained so that they can fill in for others when necessary					
At our organization, we have implemented a formal program to increase the flexibility of our employees. Employees rotate to maintain their qualification					
We continuously invest in the training and qualification of our employees. We have a dedicated development and qualification program for our employees					
We emphasize standardization as a strategy for continuously improving our processes, products and services					
We use our documented operating procedures to standardize our processes					
Optimized operating procedures are documented as best-practice processes and rolled-out throughout the organization					
Performance charts at each of our departments indicate performance objectives					
Charts showing current performance status are posted on the departments and visible to everyone					
Charts showing current performance and schedule compliance are posted on the departments and visible to everyone					
Technical documents and workplace information are posted on the departments and are easily accessible and visible to everyone					
Our vision, mission and strategy are broadly communicated and lived by our employees					
The goals and objectives of the organization are closely linked and consistent with corporate objectives. The organization has a clear focus					
The overall objectives of the organization are closely linked to the team or personal objectives of our teams and employees					
We continuously measure the quality of our processes by using process measures					
Our process measures are directly linked to our organization objectives					

3. Please, indicate below the development level of the following abilities in your organization:

Scale: from 1 (not developed) to 5 (fully developed)

Ability	1	2	3	4	5
Monitor (know what to search)					
Anticipate (know what to expect)					
Respond (knowing what to do when in face of disruptions)					
Learn (understand what has happened from successes and failures)					

Appendix B – Semi-structured interviews protocol

1. Please, tell us about your background and work experience.

2. Let us talk about the relationship between soft lean practices and organizational resilience development in service organizations. Please, tell us how soft lean practices (e.g., employee empowerment, training, work standardization, visualization, goal setting, and performance measurement) can support the development of the following resilience abilities. Please, justify your answers and provide examples.

a) Monitor (know what to search);

b) Anticipate (know what to expect);

c) Respond (knowing what to do when in face of disruptions); and

d) Learn (understand what has happened from successes and failures).

Appendix C – Means and standard deviations.

Variables	Mean	Std. dev.
Employees are encouraged to actively drive suggestion programs	2.48	0.98
Our organization forms cross-functional project teams to solve problems	2.68	0.85
We have implemented tools and methods to deploy a continuous improvement process	2.49	0.90
Each of our employees within our work teams is cross trained so that they can fill in for others when necessary	3.09	1.01
At our organization, we have implemented a formal program to increase the flexibility of our employees. Employees rotate to maintain their qualification	3.19	1.05
We continuously invest in the training and qualification of our employees. We have a dedicated development and qualification program for our employees	3.25	0.85
We emphasize standardization as a strategy for continuously improving our processes, products, and services	3.64	1.02
We use our documented operating procedures to standardize our processes	3.49	0.96
Optimized operating procedures are documented as best-practice processes and rolled-out throughout the organization	3.85	0.97
Performance charts at each of our departments indicate performance objectives	2.66	0.84
Charts showing current performance status are posted on the departments and visible to everyone	2.98	0.86
Charts showing current performance and schedule compliance are posted on the departments and visible to everyone	2.74	0.80
Technical documents and workplace information are posted on the departments and are easily accessible and visible to everyone	2.87	1.00
Our vision, mission and strategy are broadly communicated and lived by our employees	2.89	0.78
The goals and objectives of the organization are closely linked and consistent with corporate objectives. The organization has a clear focus	2.97	0.92
The overall objectives of the organization are closely linked to the team or personal objectives of our teams and employees	3.08	0.84
We continuously measure the quality of our processes by using process measures	3.31	0.86
Our process measures are directly linked to our organization objectives	3.20	0.87
Monitor	3.04	0.98
Anticipate	3.15	1.06
Respond	3.65	1.24
Learn	3.19	1.15

Table 1 – List of soft lean practices (adapted from Januszek et al., 2022)

Construct	Practice
Employee empowerment	Employees are encouraged to actively drive suggestion programs
	Our organization forms cross-functional project teams to solve problems
	We have implemented tools and methods to deploy a continuous improvement process
Training	Each of our employees within our work teams is cross trained so that they can fill in for others when necessary
	At our organization, we have implemented a formal program to increase the flexibility of our employees. Employees rotate to maintain their qualification
	We continuously invest in the training and qualification of our employees. We have a dedicated development and qualification program for our employees
Work standardization	We emphasize standardization as a strategy for continuously improving our processes, products, and services
	We use our documented operating procedures to standardize our processes
	Optimized operating procedures are documented as best-practice processes and rolled-out throughout the organization
Visualization	Performance charts at each of our departments indicate performance objectives
	Charts showing current performance status are posted on the departments and visible to everyone
	Charts showing current performance and schedule compliance are posted on the departments and visible to everyone
	Technical documents and workplace information are posted on the departments and are easily accessible and visible to everyone
Goal setting	Our vision, mission and strategy are broadly communicated and lived by our employees
	The goals and objectives of the organization are closely linked and consistent with corporate objectives. The organization has a clear focus
	The overall objectives of the organization are closely linked to the team or personal objectives of our teams and employees
Performance measurement	We continuously measure the quality of our processes by using process measures
	Our process measures are directly linked to our organization objectives

Table 2 – Characteristics of organizations (n = 106)

Organization sector			Organization's degree of interaction and customization		
Financial services	16	15.1%	Low	15	14.2%
Government services	18	17.0%	High	91	85.8%
Distribution services	25	23.6%	Organization's degree of labor intensity		
Personal services	9	8.5%	Low	30	28.3%
Infrastructure services	38	35.8%	High	76	71.7%
Organization ownership			Organization type		
Public	14	13.2%	Transnational (located in multiple countries)	61	57.5%
Private	92	86.8%	National	45	42.5%
Organization size					
≤ 5,000 employees	65	61.3%			
> 5,000 employees	41	38.7%			

Table 3 – CFA on soft lean practices

Construct	Practice	Factor loadings	χ^2/df	CR	CFI	SRMR	Cronbach's alpha	AVE
Employee empowerment	Employees are encouraged to actively drive suggestion programs	0.761	5.15/2	0.72	0.98	0.06	0.82	0.61
	Our organization forms cross-functional project teams to solve problems	0.608						
	We have implemented tools and methods to deploy a continuous improvement process	0.702						
Training	Each of our employees within our work teams is cross trained so that they can fill in for others when necessary	0.692	5.59/2	0.80	0.96	0.04	0.84	0.57
	At our organization, we have implemented a formal program to increase the flexibility of our employees. Employees rotate to maintain their qualification	0.883						
	We continuously invest in the training and qualification of our employees. We have a dedicated development and qualification program for our employees	0.525						
Work standardization	We emphasize standardization as a strategy for continuously improving our processes, products and services	0.622	5.48/2	0.73	0.97	0.05	0.78	0.66
	We use our documented operating procedures to standardize our processes	0.703						
	Optimized operating procedures are documented as best-practice processes and rolled-out throughout the organization	0.750						
Visualization	Performance charts at each of our departments indicate performance objectives	0.709	8.68/3	0.77	0.99	0.03	0.89	0.71
	Charts showing current performance status are posted on the departments and visible to everyone	0.824						
	Charts showing current performance and schedule compliance are posted on the departments and visible to everyone	0.657						
	Technical documents and workplace information are posted on the departments and are easily accessible and visible to everyone	0.501						
Goal setting	Our vision, mission and strategy are broadly communicated and lived by our employees	0.746	5.98/2	0.75	0.96	0.05	0.80	0.65
	The goals and objectives of the organization are closely linked and consistent with corporate objectives. The organization has a clear focus	0.708						
	The overall objectives of the organization are closely linked to the team or personal objectives of our teams and employees	0.712						
Performance measurement	We continuously measure the quality of our processes by using process measures	0.615	6.00/2	0.71	0.95	0.07	0.71	0.58
	Our process measures are directly linked to our organization objectives	0.808						

Table 4 – Pearson correlation coefficients

Variables	2	3	4	5	6	7	8	9	10	11	12	13	14
1-Organization sector	0.084	0.098	0.054	0.101	0.090	0.037	0.066	0.055	0.087	0.069	0.082	0.151*	0.067
2-Organization size	-	0.082	0.105	0.102	0.096	0.082	0.080	0.92	0.105	0.111	0.078	0.056	0.160*
3-Degree of interaction and customization		-	0.156*	0.180*	0.164*	0.178*	0.155*	0.150*	0.069	0.091	0.168**	0.078	0.054
4-Degree of labor intensity			-	0.169*	0.177*	0.155*	0.105	0.123	0.099	0.179*	0.056	0.084	0.097
5-Employee empowerment				-	0.349***	0.354***	0.330***	0.387***	0.382***	0.106	0.174*	0.333***	0.224**
6-Training					-	0.303***	0.345***	0.321***	0.298***	0.098	0.110	0.313***	0.180*
7-Work standardization						-	0.341***	0.322***	0.255**	0.192*	0.078	0.217**	0.226**
8-Visualization							-	0.305***	0.311***	0.334***	0.245**	0.099	0.231**
9-Goal setting								-	0.319***	0.089	0.111	0.178*	0.191*
10-Performance measurement									-	0.305***	0.215**	0.101	0.177*
11-Monitor										-	0.245**	0.232**	0.189*
12-Anticipate											-	0.231**	0.221**
13-Respond												-	0.189*
14-Learn													-

Note: * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 5 – Characteristics of the experts

Expert	Experience	Background
A	10 years	Business management
B	12 years	Industrial engineering
C	25 years	Business management
D	18 years	Industrial engineering
E	16 years	Business management
F	22 years	Industrial engineering
G	13 years	Industrial engineering
H	11 years	Industrial engineering
I	10 years	Business management
J	26 years	Industrial engineering
K	20 years	Business management
L	19 years	Business management
M	24 years	Industrial engineering
N	16 years	Business management

Table 6 – Standardized $\hat{\beta}$ coefficients for the regression analyses

Variables	Monitor		Anticipate		Respond		Learn	
	Model 1A	Model 1B	Model 2A	Model 2B	Model 3A	Model 3B	Model 4A	Model 4B
Organization sector	0.094	0.054	0.085	-0.009	0.158*	0.071	-0.086	-0.018
Organization size	0.056	-0.012	0.046	0.005	-0.021	-0.015	0.189*	0.048
Degree of interaction and customization	0.110	0.081	0.160*	0.054	-0.065	-0.023	0.079	0.012
Degree of labor intensity	0.159*	0.069	0.094	0.020	0.066	0.032	0.162*	0.067
Employee empowerment		0.094		0.168*		0.306***		0.198**
Training		-0.091		0.082		0.239***		0.156*
Work standardization		0.185*		0.079		0.221**		0.240**
Visualization		0.264***		0.234**		0.099		0.231**
Goal setting		0.082		0.102		0.175*		0.166*
Performance measurement		0.278***		0.218**		0.101		0.179*
F-value	5.181***	18.895***	6.321***	15.002***	4.323**	12.366***	7.625***	24.012***
R^2	0.042	0.274	0.051	0.256	0.038	0.334	0.060	0.358
Adjusted R^2	0.038	0.263	0.042	0.241	0.030	0.321	0.048	0.344
Change in R^2		0.232***		0.205***		0.296***		0.298***

Note: * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 7 – Summary of research findings

Soft lean practices	Monitor		Anticipate		Respond		Learn	
	Relationship	Contribution	Relationship	Contribution	Relationship	Contribution	Relationship	Contribution
Employee empowerment	N.S.		+	Active employees' engagement promotes more transparency in communication and mitigates the occurrence of unexpected issues.	+	Working in cross-functional teams helps devise more holistic solutions.	+	Promotes openness and collaboration within the organization to proactively incorporate knowledge from past experiences into new solutions.
Training	N.S.		N.S.		+	Cross-functional training leads to less resistance when implementing solutions, which makes responses quicker and more assertive.	+	
Work standardization	+	Standardization allows easier identification of conditions that deviate from expected operating conditions.	N.S.		+	Work standardization generates a common ground on which new solutions can be developed to deal with disruptions.	+	Helps register successful experiences, assuring the learning continuity.
Visualization	+	Clear visualization and understanding of the work environment and processes conditions help monitor disruptions.	+	Visualization of *status quo* leads to a healthier work environment and generates empathy within the organization.	N.S.		+	Promotes openness and collaboration within the organization to proactively incorporate knowledge from past experiences into new solutions.
Goal setting	N.S.		N.S.		+	Clear goals allow to understand the need for change, expediting the adaptation of the organization as employees more easily embrace new approaches.	+	Helps with the planning of improvements, which often relies on the assessment of previous initiatives.
Performance measurement	+	Constant display and track of performance raises awareness in organization.	+	Promote a work environment where people are not afraid to discuss problems.	N.S.		+	Enables employees to verify how effective responses were and whether there is the need for further developments.

Notes: '+' indicates a significant positive relationship; 'N.S.' indicates a non-significant relationship.