



Production

ISSN: 0103-6513

ISSN: 1980-5411

Associação Brasileira de Engenharia de Produção

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Production, vol. 29, e20190044, 2019  
Associação Brasileira de Engenharia de Produção

DOI: 10.1590/0103-6513.20190044

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# Assessment of Lean implementation in Hotels' supply chains

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## Abstract

**Paper aims:** This article aims at investigating the implementation level of Lean Supply Chain (LSC) practices in hotels' supply chains.

**Originality:** The proposed method allows to characterize LSC implementation in such an unusual context, identifying improvement opportunities and checking for discrepancies in their implementation.

**Research method:** Six different supply chains of high-quality hotels were analyzed through semi-structured interviews. Interviewees played key roles in their purchasing departments and presented large experience in the hospitality sector.

**Main findings:** Results were consolidated and for each case attributes were assigned to measure the implementation level of ten practices. Implementation scores were compared to a perceived average importance degree in order to verify convergences and divergences between the desired and actual improvement initiatives.

**Implications for theory and practice:** The applicability of LSC practices in services still needs further exploration. In the hospitality sector, whose evidence is even scarcer, this study provides a more holistic approach enabling a deeper understanding of the necessary adaptation for a successful implementation.

## Keywords

Lean supply chain. Hospitality sector. Lean production.

**How to cite this article:** Tortorella, G. L., Rosa, M. V. L. L., Caiado, R., Nascimento, D., & Sawhney, R. (2019). Assessment of Lean implementation in Hotels' supply chains. *Production*, 29, e20190044. <https://doi.org/10.1590/0103-6513.20190044>.

Received: May 9, 2019; Accepted: July 3, 2019.

## 1. Introduction

The concept of Lean Production (LP), which emerged from the principles and practices conceived by the Toyota Production System, aims at systematically reduce waste through continuously involving people and improving the flow of value according to customers perceptions. According to Womack et al. (1992), LP principles can be consolidated into five main ones: (i) determine value to customers; (ii) identify the value stream; (iii) make value flow without interruption (continuous flow); (iv) customer's demand pulls production; and (v) pursue perfection.

Although it was originally conceived in a discrete automotive production context, LP principles and practices have been adapted to a wide diversity of sectors that also need to enhance quality, efficiency and service, while reducing costs (Giannini, 2007; Asnan et al., 2015). Further, since 2000s, LP implementation focus has expanded from internally-related processes to a broader value chain scope, such as suppliers and customers relationships, establishing a linkage between LP and Supply Chain Management (SCM) (Hines et al., 2004). Thus, the term Lean Supply Chain (LSC) was originated and defined as a set of organizations linked by the flows of products,



services and information that work collaboratively to reduce costs and waste in order to meet customers' needs (Wang & Disney, 2016; Tortorella et al., 2017).

In contrast, when specifically considering the hospitality sector, evidence of LP application is still scarce (Vlachos & Bogdanovic, 2013). The hospitality sector, which has shown for many years a solid growth, is currently facing a challenging scenario (Rauch et al., 2016). The tourism and hospitality industries are considered one of the largest economic sectors worldwide, accounting for 10.4% of the global Gross Domestic Product (GDP) in 2017 and employing more than 313 million people worldwide. Particularly in Brazil, the contribution of the sector represented 7.9% of the country's GDP (World Travel & Tourism Council, 2018), which indicates its importance for the Brazilian economic performance. However, between 2015 and 2016, hotel occupancy fell by more than 7%, overcoming the fall in Brazilian GDP in the same year and reducing revenue and profit (Jones Lang LaSalle, 2017). Such challenging scenario has entailed the need for adopting and integrating improvement approaches to reduce operating costs and enhance service and quality (Kamar, 2014; Maria & Rodrigues, 2014).

Among the improvement initiatives, the adoption of LP in the hospitality sector has been gaining notoriety in some cases, such as Starwood Hotels (Lancaster, 2011). According to Fantazy et al. (2010), hospitality sector is following the trends of other sectors, since LP implementation allows a greater understanding of customers and reinforces the development of practices that foster improvements in its supply chain (Ku et al., 2011). Therefore, the incorporation of lean practices either within hotels or throughout their supply chain may enable the achievement of superior operational performance in this sector (Brito, 2015), regardless its complexity level (Moysés & Moori, 2008). However, the paucity of studies in this context undermines any further assumption (Rauch et al., 2016).

Thus, this study aims at proposing an assessment method for the implementation level of LSC practices in hotels' supply chains. The proposed method allows to characterize LSC implementation in such an unusual context, identifying improvement opportunities and checking for discrepancies in their implementation. To achieve that, six different supply chains of four- and five-star hotels were analyzed through semi-structured interviews. Interviewees played key roles in their purchasing departments and presented large experience in the hospitality sector. Results were consolidated and for each case attributes were assigned to measure the implementation level of ten LSC practices. Furthermore, implementation scores were compared with to a perceived average importance degree in order to verify convergences and divergences between the desired and actual improvement initiatives. From the academic point of view, the applicability of lean practices coupled with the SCM in services remains an area that needs further exploration (Szpilko, 2017). In the hospitality sector, whose literature is scarce, this study provides a more holistic approach enabling a deeper understanding of the necessary adaptation for a successful implementation (Brito, 2015; Rauch et al., 2016; Vlachos & Bogdanovic, 2013).

## 2. Literature review

### 2.1. Lean supply chain

Increased competition has generated pressure on organizational processes that occur no longer within organizations but also outside them (Vitasek et al., 2005). As a result, competition among supply chains and their effective management will determine success (Gardiolo & Drohomerecki, 2013; Wronka, 2016). In this sense, LSC focus on eliminating waste and adding value from suppliers to customers (Drohomerecki et al., 2012; Martínez-Jurado & Moyano-Fuentes, 2014). Rodríguez et al. (2009, p. 2) define LSC as "[...] a business network that builds on customer value-added through improvement of supply chain performance". The flow of materials and information should be seen as something integrated in its entirety, and three main characteristics are fundamental for a LSC: *(i)* transparent cost structure, sharing costs between suppliers and customers in the supply chain allows the identification of problems and consequently the search for possible solutions, thus increasing the competitiveness of the chain as a whole; *(ii)* constant evaluation of the relationships between suppliers and customers of the chain; and *(iii)* focus on seeking the cause and solution of problems in a collaborative way rather than seeking guilt and apology.

To differentiate SCM from LSC, Table 1 shows both approaches and organizational practices, regarding assumptions of analysis in several organizational areas. It also presents existing differences in relation to the applied principles and practices in SCM and LSC. While SCM emphasizes costs reduction, LSC reinforces value creation and involvement of all agents in order to establish collaboration between customers and suppliers. This integration, unlike what happens in a conventional SCM, reduces the number of suppliers and increases the efficiency of these relationships by allowing greater collaboration (Drohomerecki et al., 2012). Pérez et al. (2010) suggested a LSC model comprised by seven dimensions: *(i)* demand management; *(ii)* value definition; *(iii)* products and processes standardization; *(iv)* value chain efficiency; *(v)* processes indicators; *(vi)* partnership; and *(vii)* cultural change.

Table 1. Comparative between SCM and LSC.

Organizational area	SCM	LSC
Production	Prognostic-based	Actual customer demand-based
Customer Service	Little flexibility	Sensitive to changes and needs
Planning	Random and limited	Detailed and long-term
Process	Batches	Continuous
Quality	Quality warranty through multiple inspections	Quality warranty through continuously supporting processes
Logistics	Cost-based	Value-oriented
Suppliers	Power relationship ("win-loose")	Collaborative relationship ("win-win")
Principles and practices	SCM	LSC
Relationship with suppliers	Random and distant	Based upon trust and collaboration
Time for decision-making	Short-term	Long-term
Number of suppliers	Several sources	Few partners
Problem-solving	Limited feedback	Constant feedback and cooperation
Participation in product design	Inexistent	Frequent from the very initial stages
Suppliers assessment and selection	Cost-based	Centered in capacity, value-added and background

Source: Adapted from Martínez-Jurado & Moyano-Fuentes (2014) and Wronka (2016).

In terms of services, LSC implementation has been poorly addressed when compared to manufacturing (Giannakis, 2011). One of the reasons for that may be related to the specific nature of services, undermining a more standardized approach in their supply chain (Sengupta et al., 2006; Cho et al., 2012). Many logistics operations cannot apply to a service supply chain as well as functions and applications for storage and performance measures. Another point that is evident is the dependence of the workforce and consequently the human aspect of such an operation, adding a certain degree of complexity to the chain. Therefore, these differences must be addressed when dealing with a supply chain in service (Baltacioglu et al., 2007). According to Sampson & Spring (2012), the service supply chain is bidirectional because it requires customers to participate in the process. As much as service providers can prepare independently, service delivery depends on the customer. Ellram et al. (2004), in turn, similarly established supply chain management in services as the management of information, processes, capabilities, service performance and funds from the first vendor to the end customer.

## 2.2. Hotels' supply chains

Studies on the LSC implementation in hotels have not followed a rapid development over the past few years (Zhang et al., 2009; Szpilko, 2017), and neither there has been evidence of hotel organizations that have adopted its practices to improve performance (Fantazy et al., 2010; Odoom, 2012). The research developed by Zhang et al. (2009) was one of the first ones to approach the subject in a structured manner, emphasizing the importance of LSC to the sector.

In fact, tourism supply chain was defined as a network of tourism organizations involved in different activities, from the provision of various components of tourist products and services (e.g. flights and lodging) to the distribution of the final product in a tourist destination, involving the participation of both the private and public sectors. Moreover, Xu & Gursoy (2015) proposed a definition of hotel chain supply chain as a network of organizations linked to the hospitality sector engaged in activities of providing various components of products and services necessary to the organization (e.g. food, equipment and furniture, distribution and product marketing) and customers. Thus, a hotel supply chain involves suppliers of all goods and services offered by the hotel to end customers. In addition, a hotel supply chain framework was proposed, as displayed in Figure 1.

A hotel chain supply chain incorporates features of both manufacturing and service supply chains. For this reason, six characteristics of a hotel supply chain have been identified (Zhang et al., 2009; Xu & Gursoy, 2015). The first one is the perishability of products and services rendered and therefore impossible to store. The second feature deals with the dependence of the presentation and interpretation of the products offered to the clients so that there is a good quality hotel and customer interaction in order to generate new demands, since the hotel industry is a highly interactive industry. The third characteristic is the inherent complexity of products and services, resulting in a higher number of suppliers. The fourth characteristic deals with the uncertainty of demand stemming mainly from two reasons: high competition and external factors, such as seasonal variations and economic performance. The fifth characteristic is the inseparability between service production and the end customer (Mithas et al., 2005). Finally, the sixth trait involves the tradition sale of tourism service packages, making the relationship and cooperation among tourism organizations crucial (Moyasés & Moori, 2008; Cho et al., 2012).

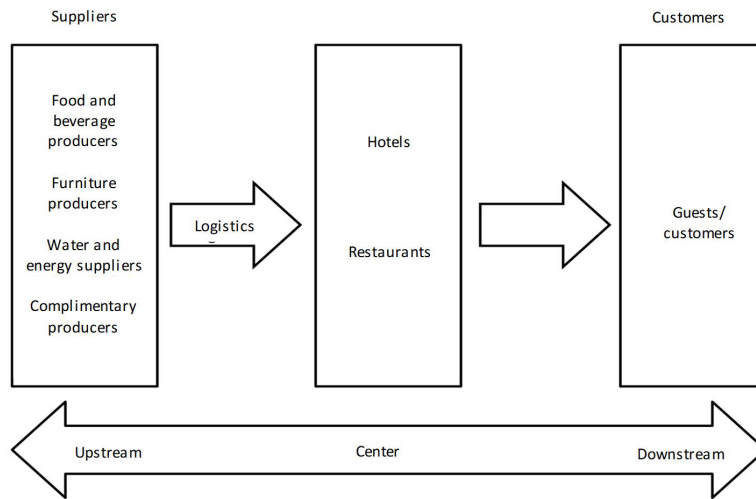


Figure 1. Hotel supply chain framework. Source: Adapted from Xu & Gursoy (2015).

### 3. Method

The methodological steps were divided into four parts: (i) definition and selection of the sample hotels; (ii) preparation of the semi-structured interview script; (iii) application of semi-structured interviews and consolidation of information.

The first step comprises the selection of the sample and is of paramount importance for the development of the research, since the appropriate sample allows the characterization of the population. A non-probabilistic sample type was adopted following Gil's (1991) recommendations. Therefore, certain criteria were stipulated in order to increase the homogeneity of the study same. The first criterion adopted was to restrict the approach to hotels located in a given region, since there is evidence that external factors such as local culture affect the application of lean practices (Kull et al., 2014). The region chosen for the study was the Southeastern of Brazil, which is the richest and most economic active region in Brazil. The second criterion comprised the quality of the hotels. Only four- or five-star hotels were part of the sample due to the associated service and operational sophistication levels that are more likely to be found in this context, favoring the adoption of improvement approaches (Kamar, 2014). In addition, such hotels are usually part of large corporate networks which present a more complex and larger supply chain, enriching the analysis. The last criterion taken into consideration was the time of existence of the hotel; a minimum of five years old was required in order to allow the achievement of a certain management maturity level (Moreira, 2012). Selection of possible hotels to compose the study sample was carried out through an initial email contacting their corresponding purchasing departments coordinator. Such initial contact aimed at knowing a little more about the hotel supply chain and, in cases where interest and availability from the hotel were noticed, scheduling the subsequent interview. In total, 28 hotels that met the selection criteria were contacted and six of them indicated interest in participating into the research, resulting in a conversion rate of 21.4%. Respondents' and hotels' characteristics are presented in Table 2. Further, as all hotels presented more than 10 years of operation and an annual average occupation rate above 57%, they were all deemed as solid organizations whose supply chains traits fit in our research.

Table 2. Sample characteristics (n=6).

Interviewees gender		Interviewees' educational level		Hotel focus	
Male	67%	Complete higher education	83%	Business	83%
Female	33%	Incomplete higher education	17%	Leisure and tourism	17%
Interviewees age		Interviewees' experience in hospitality sector		Hotel cost category	
< 30 years-old	33%	< 10 years	50%	Mid-scale	67%
Between 30 and 40 years-old	50%	> 10 years	50%	Up-scale	33%
> 40 years-old	17%	Hotel's number of employees		Hotel's total number of rooms	
Hotel quality classification		< 50	50%	< 100	17%
Four-star	83%	Between 50 and 100	17%	Between 100 and 200	50%
Five-star	17%	> 100	33%	> 200	33%

Step (ii) details the applied script for the semi-structured interviews in the hotels previously selected in step (i). This script should be organized in a way to capture the complexity of the qualitative research and to facilitate the comprehension of the perspective and reality of the hotel supply chain under study. Thus, the interview script was designed in such a way as to allow the interviewer some freedom in asking the questions in order to investigate in the best possible way and according to his own judgment the need to delve into certain points that may be raised by the interviewee (Tortorella et al., 2019). It was divided into three parts. The first one asked about information on the profile of the hotel and respondents. The second part brings, as an orientation to the interviewer, some questions regarding the adoption level of LSC practices in the respondent's hotel supply chain (see Appendix A). The examined LSC practices emerged from the combination between indications from Martínez-Jurado & Moyano-Fuentes (2014) and Wronka (2016), which are displayed in Table 1. Such practices were assessed according to the attributes proposed by Saurin & Ferreira (2008) and displayed in Table 3. The third part of the script fostered a reflection on the interviewee with the objective of capturing the importance that each one of the LSC practices has for the hospitality sector as a whole according to their experiences. A 10-point scale was used to assess the importance degree of each item, in which 0 denoted 'no importance' and 10 represented 'maximum importance' (Welliandre & Alexandre, 2003). It is noteworthy that Likert scales are a way for participants to respond to a question with a level of agreement, disagreement, satisfaction, and so on. Although these scales are technically ordinal in that they consist of a series of ordered categories, there are several authors who have researched this trait of Likert type data, and have found consistent support for the use of these variables as approximately continuous. Our rationale was centered on the fact that Likert, or ordinal variables with five or more categories can often be used as continuous without any harm to the analysis you plan to use them in (Johnson & Creech, 1983; Norman, 2010; Sullivan & Artino Junior, 2013; Zumbo & Zimmerman, 1993). Thus, we considered LSC practices as ordinal approximations of continuous variables. A pre-test of the proposed script was performed with 2 academicians, who indicated a few improvements mainly concerning the statements and questions on its second part.

Table 3. Attributes and corresponding weights.

Attribute	Weight
Not applicable (NA)	-
Not existent (NE)	0.0
Extremely poor application (EPA)	2.5
Poor application (PA)	5.0
Moderate application (MA)	7.5
Full application (FA)	10.0

Source: Adapted from Saurin & Ferreira (2008).

The semi-structured interview, step (iii), was then carried out with hotel employees that had at least one year of experience and played a leadership role in the hotel supply chain or some equivalent management position to ensure sufficient knowledge on the demanded information. Interviews were carried out during six visits to the selected hotels during the period of September and October 2018; each interview varied from 45 to 75 minutes.

In addition, to consolidate and analyze information both practices and hotels' supply chains were ranked based upon their importance scores. Such scores represented the implementation level of a given LSC practice or within a certain hotel supply chain, respectively, and they were obtained by:

$$Score = \frac{(B * 2.5) + (C * 5.0) + (D * 7.5) + (E * 10.0)}{A} \quad (1)$$

where:  $A$  = total number of items evaluated;  $B$  = number of items whose application was extremely poor (EPA);  $C$  = number of items whose application was poor (PA);  $D$  = number of items whose application was moderate (MA); and  $E$  = number of items whose application was full (FA).

These implementation scores enabled ranking all hotels' supply chains and LSC practices, which were then compared with the associated importance degree to verify further improvement opportunities through analysis of the discrepancies between them. Finally, it is noteworthy that Likert scales are a way for participants to respond to a question with a level of agreement, disagreement, satisfaction, and so on. Although these scales are technically ordinal in that they consist of a series of ordered categories, there are several authors who have researched this trait of Likert type data, and have found consistent support for the use of these variables as approximately continuous. Our rationale was centered on the fact that Likert, or ordinal variables with five or

more categories can often be used as continuous without any harm to the analysis you plan to use them in (Johnson & Creech, 1983; Norman, 2010; Sullivan & Artino Junior, 2013; Zumbo & Zimmerman, 1993). Thus, we considered LSC practices as ordinal approximations of continuous variables.

#### 4. Results

From the interviews performed with each purchasing department coordinator, hotels' contexts were understood and relationships with suppliers/customers outlined. Table 4 shows the adoption levels and scores for each LSC practice embraced in the interviews and the corresponding scores for hotels' supply chains. Additionally, the average interviewees' perception regarding the degree of importance of each LSC practice for their hotel supply chain is displayed. This result allowed to verify the agreement level between practices actually implemented and the ones considered more relevant.

Table 4. LSC practices adoption level in each hotel supply chain and corresponding scores.

LSC practices	General comments and observations	Hotels' supply chains						Practices implementation scores	Practices average degree of importance
		Case <sub>1</sub>	Case <sub>2</sub>	Case <sub>3</sub>	Case <sub>4</sub>	Case <sub>5</sub>	Case <sub>6</sub>		
<i>Isc<sub>1</sub></i> -Collaborative relationship based upon mutual trust and commitment	Suppliers are seen as a strategic part of the vale chain.	FA	FA	FA	FA	EPA	PA	7.92	9.58
<i>Isc<sub>2</sub></i> -Low vertical integration	Evidence of low vertical integration with strong emphasis on core business.	MA	FA	PA	MA	FA	FA	7.92	8.33
<i>Isc<sub>3</sub></i> -Few supply sources	Number of suppliers varied between 15 and 75.	FA	MA	MA	FA	FA	EPA	8.33	6.67
<i>Isc<sub>4</sub></i> -Small-batch and frequent deliveries	Most deliveries are performed in a monthly basis, and weekly deliveries are less common.	PA	PA	PA	PA	FA	PA	3.75	9.17
<i>Isc<sub>5</sub></i> -Kanban with suppliers	Lack of knowledge on the practice, but great interest on its benefits.	NE	NE	NE	NE	NE	NE	0.00	7.50
<i>Isc<sub>6</sub></i> -Selection criteria based upon suppliers' capacity, value-added and background	Price and quality criteria still prevail over supplier's background.	MA	PA	PA	FA	EPA	PA	5.00	8.75
<i>Isc<sub>7</sub></i> -Constant communication and information sharing	Besides contact for purchasing orders, communication and information sharing are poorly reinforced.	NE	EPA	EPA	NE	EPA	EPA	3.33	8.75
<i>Isc<sub>8</sub></i> -Suppliers adopt quality techniques	Hotels do not perform systematic quality control and have no visibility of their suppliers' quality processes.	NE	NE	NE	NE	NE	NE	0.00	7.92
<i>Isc<sub>9</sub></i> -Cooperative problem-solving with constant feedbacks	There is little evidence on cooperative problem-solving. Most cases report a simple substitution of materials without any major structured analysis.	NE	NE	NE	PA	NE	MA	1.67	10.0
<i>Isc<sub>10</sub></i> -Common performance indicators with suppliers	The only performance indicator followed-up regards hotel's customers satisfaction and a random information sharing on products/services provided.	NE	PA	MA	PA	PA	MA	3.75	7.50
Hotels' supply chains scores		3.25	6.00	5.00	6.75	5.00	5.25		

NE = Not existent; EPA = Extremely poor application; PA = Poor application; MA = Moderate application; FA = Full application.

First, from a hotel supply chain perspective, overall scores presented a low variation (coefficient of variation=22.6%) among the studied cases. Case<sub>4</sub> achieved the highest score (6.75), indicating a 'full application' of *Isc<sub>1</sub>* (collaborative relationship based upon mutual trust and commitment), *Isc<sub>3</sub>* (few supply sources) and *Isc<sub>6</sub>* (selection criteria based upon suppliers' capacity, value-added and background); while Case<sub>1</sub> presented the lowest score (3.25) indicating a 'full application' only for *Isc<sub>1</sub>* and 'not existent' for five LSC practices. Moreover, comparing interviews from both cases, the greatest difference emerged from the implementation level of practice *Isc<sub>6</sub>*, which seems to be more extensively and holistically applied in Case<sub>4</sub>.

Practice  $Isc_3$  was the one whose implementation level seems to be the highest (score=8.33) across the assessed hotels' supply chains. Based upon the recommendations obtained from interviews, a low number of supply sources was considered up to 30 different suppliers. Further, the number of suppliers per item was taken into account to better understand the set of suppliers with greater proximity between with the studied hotels. Thus, hotels with up to 30 suppliers and predominantly one supplier per item were rated as 'full application' (FA). The number of suppliers within the study sample ranged from 25 to 70 per hotel, except one case that affirmed to have more than 70 suppliers. This practice is aligned with the concept of *kyoryoku kai*, which denotes any suppliers' association that enhance lateral communication. This concept was extensively applied in Japan at Toyota's supply chain, which was represented by a group of its most important suppliers working jointly to develop more efficient supply methods with a base line aim of reducing costs (Hines, 1998; Tortorella et al., 2017). Thus, a reduced number of suppliers may reinforce such association allowing a closer relationship. However, its low importance degree (6.67) might indicate that this association can occur unintentionally throughout hotels' supply chains.

On the other hand, practice  $Isc_9$  (cooperative problem-solving with constant feedbacks) received the highest average importance degree. This practice is related to structured and scientific approaches to address supply chain issues and promote continuous improvement through a robust learning process (Spear & Bowen, 1999; Spear, 2008; Shook, 2009). All interviewees understand that this practice has a vital importance for the development of hotels' supply chains. Nevertheless, its actual implementation was only evidenced in Case<sub>4</sub> and Case<sub>6</sub> as a poor and moderate application, respectively. In fact, most interviewees have similarly argued that whenever problems related to their suppliers are identified, suppliers would collect the damaged or nonconforming material substituting it by a new one. In this sense, hotels have minimum visibility of how supplier issues were analyzed and addressed, assuming a passive and low-cooperative posture towards problems.

It is noteworthy that, out of the ten LSC practices listed,  $Isc_5$  (*kanban* with suppliers) and  $Isc_8$  (suppliers adopt quality techniques) were indicated as 'not existent' in all studied cases. Regarding  $Isc_5$ , the closest evidence of any inventory control practice was a limited utilization of Enterprise Resource Planning (ERP) in only one case for simply purchasing of products. Although interviewees indicated a lack of its application, all of them demonstrated great interest on its benefits. This can be noticed by the relatively high average degree of importance attributed to this practice (7.50). Similarly, despite the fact that interviewees acknowledge the importance degree of practice  $Isc_8$  (7.92), none of the hotels performed any kind of quality control/inspection when receiving materials of any nature. Only one case claimed a specific initiative of keeping track of temperatures under which food was supplied. Overall, the lack of adoption of these LSC practices together with the perceived degree of importance suggest that both material management and quality control still have much potential for improvement in the hospitality sector.

In turn, some LSC practices presented similar scores for their implementation and average importance degree. Practice  $Isc_2$  (low vertical integration), for instance, showed an implementation score of 7.92 and an average importance degree of 8.33. This result suggests that hotels have been consciously investing implementation efforts to minimize activities that are not part of their core businesses. In fact, interviewees have mostly mentioned that there is a strong strategic focus on developing services that can actually differentiate the hotel from its competitors. Services and/or products that might not originate such competitiveness increment have been delegated to suppliers or outsourced with partners, reducing costs and favoring quality enhancement. These findings somewhat converge to indications from Wirtz et al. (2015) and Cusumano et al. (2015), which argue that services organizations are more likely to obtain significant financial and operational advantages if they specialize in certain aspects of the provided service and develop key partners that complement and share the remaining ones.

## 5. Conclusions

This study aimed at assessing the implementation level of LSC practices in hotels' supply chains. The proposed method allowed to verify the extension in which LSC practices are being implemented in the hospitality sector, identifying improvement opportunities and grasping their maturity in such context. Contributions of this research are relevant for both academicians and practitioners.

First, in theoretical terms, this research contributed to the body of knowledge on LSC since it approaches a scarcely addressed supply chain context, such as the hospitality sector. Furthermore, through the case studies investigation, we provided evidence on how lean principles are being disseminated into this sector suggesting that some practices are intuitively adopted despite the existence of an intentional supply chain strategy. On the other hand, the potential for developing and improving such supply chain is still unknown, since no evidence of implementation was observed for a few LSC practices. This fact suggests that there may exist benefits and

hidden challenges that neither academia nor organizations are aware of, especially if we consider the integration of those practices with novel digital technologies raised by the Fourth Industrial Revolution.

As for practical contributions, this work provided managers and organizations evidence that LSC practices are feasible of implementation in the hospitality sector, although some level of adaptation may be required. Additionally, it unfolds the distance between the desired (denoted as importance degree) and the actual implementation level of improvement initiatives in hotels' supply chains. Such results raise managers attention to strategic improvement efforts that may need to be redirected in order to enhance hotels' supply chains. This fact is especially true when considering aspects related to quality control and material management across the hospitality sector. An increased awareness level on this issue can motivate further initiatives that might catalyze the development of such an economically important supply chain.

It is also necessary to highlight the limitations of this study. The first limitation is related to the delimitation of the sample. Because it involves only four- and five-star hotels, results presented here should not be generalized to hotels with lower quality ratings. In addition, the reduced sample size ( $n=6$ ) undermines further statistical inferences that could add robustness to our findings. Therefore, future studies could not only increase sample size, but also diversify its composition in order to check for specific contexts within the hospitality sector itself that can affect LSC implementation. Overall, much still needs to be deepened in terms of lean implementation, especially when considering a mix of services and goods such as hospitality sector. Hence, the continued investigation of this theme may raise complementary insights that will impact the way these organizations and their corresponding supply chains are currently managed. Finally, it is worth mentioning that the comparison between average importance degree and the scores of practices implementations features a methodological limitation of our study, since each analysis is performed using different scales. Thus, we envision that future studies with larger sample sizes could also perform more robust statistical analysis to examine the implementation level of LSC practices in hotels' supply chains, and possibly verify their association with operational performance metrics.

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Appendix A. Semi-structured interview on the adoption level of LSC practices.

1. How is the relationship between your hotel and its suppliers? Please, explain it in terms of the openness and intensity levels.
2. What kind of partnership policies does your hotel apply with suppliers and customers?
3. How these partnerships are managed?
4. How do you develop or add new suppliers?
5. How do your suppliers deliver to you? Please, explain in terms of frequencies and quantities.
6. How do you send information on your demand requirements? How often?
7. Which kind of information do you share with your suppliers? How often?
8. How is feedback provided regarding suppliers' performance? How do you address supply chain problems?
9. Which are the criteria that your hotel considers for selecting suppliers? How are they managed?
10. What are the performance indicators that you track and manage with your suppliers?