Lean Thinking and Tourism management – an Airbnb case study in Douro

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Abstract. Due to increasing globalization and competitiveness among organizations in the market. Especially Cultural and Tourist Organizations can and should adopt tools and methodologies that allow them to increase their productivity and guarantee their sustainability, in order to increase their competitive advantage over the competition. That is why Lean and Six Sigma play a key role in the management of these organizations. Thus, the objective of this article is to present a brief literature review on the topic Lean Six Sigma in Tourism, with the primary objective of analyzing the importance of this concept in Airbnb in Douro – Lamego. Thus, all analyzes revealed that this topic is a very interesting subject, as it is complex and important in the performance and survival of these organizations. In short, any type of organization that is concerned with accompanying the evolution of society considered an organization more prepared for the future, guaranteeing its sustainability, thus increasing the quality of the services provided. In this way, we will be avoiding waste and creating value.

Key words: *Waste & value, Tourism, Lean, Six Sigma*.

1 Introduction

Tourist and cultural organizations have an enormous need to adopt new management tools and techniques, which allow them to guarantee and increase sustainability and productivity.

The tools used by the Lean and Six Sigma process play a key role in increasing your competitive advantage over the competition.

The purpose of this article is to present a brief bibliographic review on the topic Lean Six Sigma and see its applicability in Tourism, based on the Airbnb platform in Douro – Lamego.

All analyzes carried out revealed that this topic is a very interesting subject, because it is complex and important in the performance and survival of these organizations. In short, any type of organization that is concerned with accompanying the evolution of society is considered an organization more prepared for the future, guaranteeing its sustainability, thus increasing the quality of the services provided. In this way, we will be avoiding waste and creating value.

2. Literature Review

The 21st century has been the scene of several changes that have affected patterns and habits in the tourist offer with products and services that weren´t used or provided.

The emergence of information technologies and the digital age has allowed the development of 'new' possibilities that directly affect the way in which we carry out daily actions, even influencing the ways of consuming, traveling and staying (Zimmermann, Humes, & Meira, 2019) [1]. In the Tourism segment and, above all, in the accommodation scenario, technological innovation and expansion and collaborative consumption, through a circular economy, contributed to the creation of platforms that aim to help the restructuring and redimension of the accommodation concept, giving rise to the so-called 'tourism 2.0' (William & Martel, 2008) [2]. In this concept, a tourist ecosystem was created supported by digital social networks and fed by those who participate in it, creating complex dynamics (Moreira & Gomes, 2018) [3].

Undoubtedly, the point-to-point concept, which exists in Airbnb, is based on a process in which the subjects involved in a task are directly connected to each other, without the presence of mediation. Direct intervention in the occurrence of this type of connection reduces the costs inherent to the dissemination and internationalization process.

When we analyze this process of emergence of collaborative consumption, we verified that a trend that occurs in function of and from the technological expansion and the means of communication, by modeling a network society. This procedure allow the circulation of new ideas and creativity, in addition to facilitating the access to goods and services through applications that reduce costs, making them more accessible to the population and encouraging their adhesion by creating new segments associated with consolidated practices. In this sense, it is possible to satisfy multiple profiles and needs (Bezerra & Ferreira, 2018) [4].

We can observe that the new spaces allow for greater interaction between the parties involved, creating an environment in which the accommodation is complemented by the experience of the relational process, that is, by everything that happens from the search for the space to the end of its use (Molz , 2014) [5].

In this sense, the application of the Lean process can be a factor of sustainability and value creation in this segment of tourism.

Lean Production evolved into Lean Thinking, with the central objective of the idea of continuous search for the elimination of any waste, aiming at the continuous improvement of an organization (Womack & Jones, 2003)[6].
The growing demand for quality in the services provided, for standardization and cost reduction are challenges that any organization faces in its day-to-day in carrying out its activities. Therefore, this document represents an entire research work focused on customer satisfaction, as this is the main principle of the Lean Six Sigma philosophy, in addition to the constant search for increasing profit margins.
In this sense, this article focuses on the application of Lean Six Sigma management in the area of Tourism, but especially in airbnb structures, with the aim of exploring the possible achievement of rapid improvements in the management of the processes of these organizations. By implementing the tools and principles of this methodology, we can reduce waste and create value.
Thus, in order to carry out this investigation, several documents on the subject were analyzed which, through the analysis of various sources, made it possible to perceive the importance of the applicability of the Lean and Six Sigma methodology to overcome the current challenges that Airbnb organizations/companies face. , in your day to day.
Thus, throughout this work, the existing sustainable methods and their respective measures will be specified. In addition to what has been stated, the way in which their implementation in the region is facilitated or not will be perceived, and the benefits that the organizations/companies that apply them acquire.

3. Lean Thinking

This concept emerged in Japan, more specifically in the Toyota Production System, in 1940, in which it intended to produce different models of cars, on a small scale and with cost reduction, in order to face the American automobile industry, which produced on a large scale. With the implementation of this concept, Toyota achieved a large volume of sales since the year 1950 (Carvalho, 2021) [7].
Lean started to be adapted for operations management in 1984, and in 1992, Lean Thinking appears which in turn is focused on services, currently, Lean Heathcare is also discussed, for issues related to health (Rodrigues & Neto, 2017) [8].
When approaching this topic, it is essential to take into account other concepts associated with it, such as value and waste. Thus, according to (Pinto, 2014)[9] cited by (Calé, 2015, p. 17)[10], value “is everything that justifies the attention, time and effort we dedicate to something”. Waste is all activities or functions that are performed that do not add any value.
Lean in its essence consists of the search to do more with less, that is, production must happen at the right time; in an exact amount; with the least possible number of equipment; with the appropriate products; in the shortest time; in the smallest space and with little labor.
This philosophy, according to Calé's (2015) line of thought, allows employing teams of multi-skilled people in practically all sectors of organizations, even if their objective is the search for low costs, reaching zero stocks and to develop and/or acquire extremely

flexible equipment. Therefore, that it is possible to carry out a greater production, reaching an increase in the variety of products, always focusing on the maximum satisfaction of all customers of the organizations/companies.

3.1.1 Lean - Waste and Value

Lean according to Farinha (2015)[11] is concentrated in three distinct subsections:

- Lean Thinking;
- Lean Manufacturing;
- Lean Production.

Lean Thinking "is a management philosophy through which organizations develop skills towards the gradual elimination of waste and value creation, constituting at this moment in the view of some companies an antidote to the crisis" (Farinha, 2015, p. 26).
Lean Manufacturing is the philosophy that organizes production activities with the aim of eliminating all waste. Also linked to this idea is the commitment to continuous improvement (Kaizen) of all processes by workers (Farinha, 2015).
Finally, Lean Production is oriented towards the production of a great diversity of products in small batches and manufactured in less time. Quality, flexibility and low cost are some of the characteristics of this idea (Farinha, 2015).
A work and research team formed by Womack and Jones, in 1996, identified five principles of the Lean philosophy: a) value creation; b) definition of the value chain; c) flow optimization; d) implementation of the Pull system; e) search for perfection (Carvalho, 2021).
According to Womack and Jones (2003), Lean thinking is based on five fundamental principles:

1. Specify value – identify what value means from the customer's point of view in order to create value that is perceived by the customer as such;
2. Identify the value chain – identify the sequence of actions and processes that create value for the customer;
3. Value stream – promoting a continuous flow of value-generating activities, ensuring that everything that does not add value to the process is eliminated;
4. Pull – produce only what needed, when it is needed and in the amount needed; production must be "pulled" by the customer, eliminating stocks;
5. Perfection – continuously seeking improvement (kaizen) in processes, in order to reduce costs, deadlines, errors, space and create new forms of value (p.8).

In 1998, one of the former Toyota engineers, Shingo, identified seven types of waste, which are considered the biggest losses in the industry (Figueiredo T. J., 2016) [12], being then the following:

► **Transport**: I include all unnecessary transport of products and raw materials, which, in turn, do not add value to the product and thus increase lead-time;

► **Inventory**: an organization that keeps products in inventory will not be able to add any value to the product;

► **Movement**: refers to the set of unnecessary movements that do not add value to the products and processes, these are attributed to the operators and

is visible in situations where tools are reached or when moving equipment within the workplace;

► **Waiting:** Waiting can take many forms, ie, waiting time for information, machines on hold, material on hold in the inventory, among others;

► **Overproduction**: the next process, sooner or faster than what requires means that larger quantities are produced;

► **Over processing:** when extra operations are carried out to produce something that is intended, even if the error is in the equipment or the employee, the costs increase;

► **Defects or Rework:** these are defects in products that occur during their production, requiring the same work to be redone.

Currently, together with these seven wastes identified, there is another waste, which is the non-utilization of human potential, which arises from situations in which workers with vast knowledge and skills are available, but which, unfortunately, are not used, for the simple reason fact that they are busy with simple jobs (Figueiredo T. J., 2016).

3.1.2 Lean Tools – Lean Thinking

The Lean method uses several tools in its implementation, namely: the Just in Time; the 5S's Methodology; the PDCA cycle; the VSM – Value Stream Mapping; Kanban and Kaizen.

The Lean philosophy has created, over time, several techniques and tools that are fundamental for improving effectiveness and efficiency, thus, these tools enable the practice of good management and organization practices (Figueiredo T. J., 2016). Some of these tools are:

► PDCA cycle: characterized by four phases, planning, implementation and execution of actions, verification and standardization and establishment of changes;

► 5S: Created to overcome the need to put in order the permanent confusion, aiming to change people's behavior, so that it is possible to organize the entire organization. This is composed of five steps: seiri/sort, separation of all material in the workplace; seiton/simplicity, tidiness and organization of space; seiso/shine, cleaning the workstation; seiketsu/standardise, standardizing the measures taken in the previous steps; shitsuke/sustain, discipline all employees to maintain the procedures created;

► Kaizen Blitz: A Japanese expression for continuous improvement. Its objective is to achieve continuous improvement at all levels of the process, in order to increase productivity, with minimum cost, satisfying customer needs. It is a very fast method, as it only needs 2 to 5 days for its implementation, which allows the necessary changes to be made in a process. It aims to detect and eliminate tasks that do not create value for the company. This philosophy aims to achieve continuous improvement, aiming to reduce costs;

► Kanban: It originated in Japan and means “card”. It is one of the simplest methodologies, as it makes it possible to speed up the delivery and production

of raw materials and helps to decide what to produce, when and in what quantities, thus giving importance to the output's and not so much to the input's, that is to say that if is customer focused;

► Just in time: System in which the production of materials takes place as they are needed, that is, the right product is called at the right time, in the right quantities. This has many advantages, however, the most important are quality improvement, greater flexibility, cost reduction and greater reliability of the production system.

In short, this theme, according to the perspective of (Rodrigues & Neto, 2017, p. 54) [13] aims at "the elimination of waste, that is, any activity that demands resources, but does not create value for the customer", so that this can happen. , it becomes necessary to reduce lead-time, increase quality, reduce costs and develop safety and ergonomics in organizations' production processes.

3.1.2.1 Just in Time

The Just in Time philosophy appeared in the mid-1970s in Japan through Taiichi Ohno, in Toyota systems (Javadian Kootanaee, Babu et al., 2013) [14].

According to Lustosa & Mesquita (2008) [15] Just in Time consists of having a product in the exact quantity, that is, having the quantity considered necessary, at the necessary moment, since the waiting time for lack of a product and/or excess products give rise to high costs and great waste.

From the perspective of the authors, Lustosa & Mesquita (2008), for Just in Time to work, it is essential to have some assumptions, namely:

- Reduction of preparation times;
- Use of a highly skilled workforce;
- Standardization of operations;
- Reorganization of layouts (pp. 34-35).

3.1.2.2 The 5S's methodology

The 5'S is another tool used by Lean Thinking, the main objectives of this method are: improve the quality of products and/or services; improve the work environment and customer service; improve the quality of life of employees; to educate for the simplicity of acts and actions; maximize the use of available resources; reduce expenses and waste; optimize physical space; reduce and prevent accidents; improve human relationships and increase employees' self-esteem (Moreira, 2011, p. 35) [16].

The acronym 5S came from five Japanese words that start with the letter S:

- SEIRI – Sense of use: Separating the useful from the useless, eliminating the unnecessary;
- SEITON – Sense of Tidiness: Identify and arrange everything, so that anyone can easily locate it;
- SEISO – Sense of Cleanliness: Keeping a clean environment, eliminating the causes of dirt and learning not to get dirty;

• SEIKETSU – Sense of Health and Hygiene: Maintain a work environment that is always favorable to health and hygiene;
• SHITSUKE – Sense of Self-Discipline: Making 5S a habit, transforming 5s into a way of life (Moreira, 2011).

3.1.2.3 The PDCA cycle

The PDCA cycle is a method used to "effectively control the management processes of a company. Being a cycle, it is a continuous control, since it does not foresee intervals or interruptions" (Sokovic, Pavletic et Al, 2010) [17].
The main objective of this tool is to achieve the continuous improvement of the stages of a process, through its improvement, identifying the causes and problems and later implementing solutions in order to solve them (Ferreira, 2016)[18]
The four phases of the PDCA cycle are - Plan, Execute, Control, Act (Ferreira, 2016).

a) Planning refers to the need to plan the work through the implementation of an action plan, after the identification, recognition of characteristics and discovery of the causes of the problem.
b) The second phase, executing, consists of carrying out the planned work taking into account the action plan.
c) In the third phase, the verification phase, what was accomplished must be measured and/or evaluated, identifying the difference between what was done and what was planned.
d) In the fourth and final phase of the PDCA cycle, taking action, after analyzing the results, is essential to act on the executed plan, improving it, if considered essential, or promoting process improvement.

3.1.2.4 VSM - Value Stream Mapping

The VSM is a process of identifying all related activities along the value stream of a given product (Moreira, 2011)[19]. The value flow of a product is the set of various activities that arise from the order to the delivery of the product to the consumer (Moreira, 2011).
In the words of Moreira (2011) the VSM: It is a process of observation and understanding of the current state of production and the illustration of a map of the processes that will become the basis for Lean Thinking, that is, it is a visual representation of each process in the flow of material and real information that is reformulated. a set of key questions and a map of the future state of how production should proceed (p.33) is drawn.
Rother (1999) [20] consider that the VSM is "a fundamental tool, as it helps to visualize the flow, as being more than simple individual processes and helps in the identification of waste".

3.1.2.5 Kanban

The word Kanban has its origin in Japanese and means registration or visual card (Moreira, 2011).
The Kanban methodology is defined as a way of ordering work, establishing the mode of production, how transport takes place and where it should be delivered (Moreira, 2011).
"The card, or signal, works as a production alert, coordinating the production of all items and also can visually control production and schedule production according to the — `pull system'" (Moreira, 2011, p. 48).

3.1.2.6 Kaizen

The word Kaizen comes from the junction of Kai - which means change -, and Zen - which means doing better. Is a Japanese word that represents continuous improvement (Gonçalves, 2017)[21].
According to Moreira (2011) the Kaizen methodology is based "on the elimination of waste based on common sense, on the use of cheap solutions to help motivate and creativity of employees to improve the practice of work processes, in the search for improvement continuous" (p.48).
Another tool used in the 20th century, relevant for the implementation of Lean Thinking, Six Sigma, a philosophy of quality that was used by several world-renowned companies, namely Motorola, General Electric, Ford, Honda, Sony, Samsung, American Express, etc. (Aboelmaged, M. (2010) [22].
Naumann and Hoisington (2001)[23], stated, "the concept of Six Sigma is the development of a method to measure and supervise the performance of a process with high expectations of improvements. in the final product".

3.2 "Six Sigma" methodology

Sigma is the letter of the Greek alphabet used to define standard deviation, a statistical measure of variation, the exception to expected results. One can think of standard deviation as a comparison between expected results or outputs in a group of operations, versus those that fail. The standard deviation measurement shows that defect ratios, or exceptions, are measurable. Six Sigma is the definition of results as close to perfection as possible (Aboelmaged 2011, p. 2).
According to Carvalho (2008) [24] Motorola was the pioneer company in the application of Six Sigma. Bill Smith, Vice President and Chief Quality Officer at Motorola is universally known as the founder of Six Sigma.
According to General Electric Six Sigma is:
A highly disciplined process that leads to the development and delivery of near-perfect products and services. The core idea behind Six Sigma is to be able to measure how many defects there are in a process, systematically figure out how to eliminate them, and get as close to zero defects as possible. To achieve Six Sigma Quality, a process

must not produce more than 3.4 defects per million opportunities (Craveiro, 2020, p.11) [25].

Pavezzi (2021) [26] defines Six Sigma as: a Strategy that aims to significantly expand the performance and profits of companies, by improving the quality of goods and processes, increasing customer satisfaction and reducing variability. This methodology focuses on the company's strategic objectives, establishing that all key sectors have improvement goals based on quantifiable metrics (p.26).

Six Sigma is a business plan and a systematic methodology, which leads to an increase in profitability through the gains obtained by quality products/services, customer satisfaction and productivity (Távora, 2009)[27].

Six Sigma integrates two methodologies: DMAIC and DMADV. DMAIC is used when the process already exists, in turn, DMADV is used when it is intended to create a new product or process (Távora, 2009).

According to what the author (Carvalho C. E., 2008) says, Six Sigma to improve processes uses the DMAIC Method, which in turn consists of 5 phases, which are tools that provide continuous improvement of processes, increase the productivity and profit margin, these phases are as follows:

- ► Define: consists of identifying the project, selecting and defining an improvement project;
- ► Measure: allows you to document the project and measure its capacity;
- ► Analyze: consists of collecting and analyzing data so that the critical characteristics of the process can be identified;
- ► Improve: experiments are carried out to determine the most important variables and the process result is optimized;
- ► Control: is the measure of the new capability of the process and control of what has been gained with it.

The other method, called DMADV, is applied to existing processes (Carvalho C. E., 2008).

DMADV is the acronym of the five phases that make up this methodology, which are:

1. Define - define the new process and the respective ones;
2. Measure – identify and measure the process and customer needs;
3. Analyze – analyze options and feasibility;
4. Design – process development in order to satisfy customer needs;
5. Verify – process validation in order to see if it meets the customer's needs (Craveiro, 2020, p. 13).

3.3 Lean and Six Sigma Comparative Analysis

After explaining the fundamentals of Lean and Six Sigma, it is evident that the second philosophy could clearly be a continuity/improvement of the first, in a complementary relationship, demonstrating what sustainability and improvement processes should be in organizations - a increasingly relevant and crucial criterion.

Despite this, there are some differences between these two methods that, from the outset, emerged in two different times.

Lean presents a very strong position in relation to the elimination of waste, in an alliance with the organization's ability to reconcile the production process with the almost immediate consumption of the product or service. In this methodology, there is a greater concern in relation to the timing of production or performance of a service and the continuous improvement of its processes.
Sigma Six presents itself as a more recent method, which takes into account the processes of evaluation and measurement/evaluation, in relation to the control of defects that may exist in the elaboration of a product or service, in order to eradicate them. completely in order to reach perfection. Thus, Six Sigma, with great emphasis on expanding profits, introduces more rigorous methods of planning and control.
The particular characteristic of these platforms, such as Airbnb, contributes to the symbolic co-creation of identity and meanings linked to brands (Yannopoulo, Moufahim, & Bian, 2013) [28], reinforcing connections with subjects and encouraging their consumption by promoting bonds of identification, contributing to the extension of the self through consumption (Belk, 2013) [29].
The option to study Airbnb, more specifically some of the offers promoted by this platform in a given territory, based on two relevant aspects:
First, there are indications that point to the fact that Airbnb has real impacts on hotel revenues (Zervas, Proserpio, & Byers, 2017) [30]. This question, in addition to confirming the reconfiguration of the accommodation segment, highlights the importance of investigations on Airbnb both for the academic field of Tourism and for practitioners of this market;
Second, the fact that there are several studies on this platform, contributing to the understanding of important aspects such as the reasons associated with joining the service (Guttentag, Smith, Potwarka, & Havitz, 2018) [31]. The evaluation of electronic word-of-mouth on the platform (Bridges & Vásquez, 2018) [32], pricing practices (Wang & Nicolau, 2017) [33] and co-creation and co-destruction of value (Camilleri & Neuhofer, 2017) [34].

3.4 Airbnb - Lean Thinking and Sigma Six

Airbnb is a community based on connection and belonging—a community that was born in 2008 when two hosts welcomed three guests to their San Francisco home, and has since grown to 4 million hosts who have welcomed over 800 million guest arrivals to about 100,000 cities in almost every country and region across the globe.
Hosts on Airbnb are everyday people who share their worlds to provide guests with the feeling of connection and being at home. At Airbnb, we believe that hosts, guests and the communities where we operate are all stakeholders we have a responsibility to serve, and that by serving them alongside our employees and investors, we will build an enduringly successful company.
As it is a relatively new company, it is still difficult to obtain information on the subjects, at a territorial level, who use the service. This limitation is due to the fact that the space in which it is located is a segmented niche in the market (Guttentaget al., 2018) [35]. In this sense, the emergence of companies such as AirDNA and Inside Airbnb, which provide data about Airbnb, makes the use of secondary data more attractive.

As mentioned, and because it is a recent phenomenon, research on Airbnb has a wide range of possible questions to be investigated. In this sense, the study by Guttentag (2015) made a map with a series of research problems, which can be used to study aspects associated with Airbnb, having them divided into six major areas. The major research areas listed by Guttentag (2015) were: a) 'impacts on destinations', b) 'impacts on accommodations', c) 'type of appeal', d) 'loyalty', e) 'choice between offers on Airbnb' and f) 'attitudes of locals'.
These being the main factors, it would be important to analyze How can we adapt Lean Thinking to tourism accommodation, supported by Airbnb?
In order to apply the Lean Thinking process, we use the Ishikawa diagram.
The Ishikawa (Fishbone) diagram consists of a graphical representation that allows you to visualize the causes that explain a given problem and guide the decision-making process by dealing with the bases that determine poor performance. In our case, the main problem is the poor service provided in the accommodation (houses), which is the effect of all the causes that make up the team, procedures, inputs, products and the environment.
As seen in the Ishikawa diagram (figure1), we can detect the main causes of deficient service, in this case, the labor force and the methodology used in most of the accommodation/houses.
Ishikawa diagrams fig.1 (also called fishbone diagrams, herringbone diagrams, cause-and-effect diagrams, or Fishikawa) are causal diagrams created by Kaoru Ishikawa that show the potential causes of a specific event.

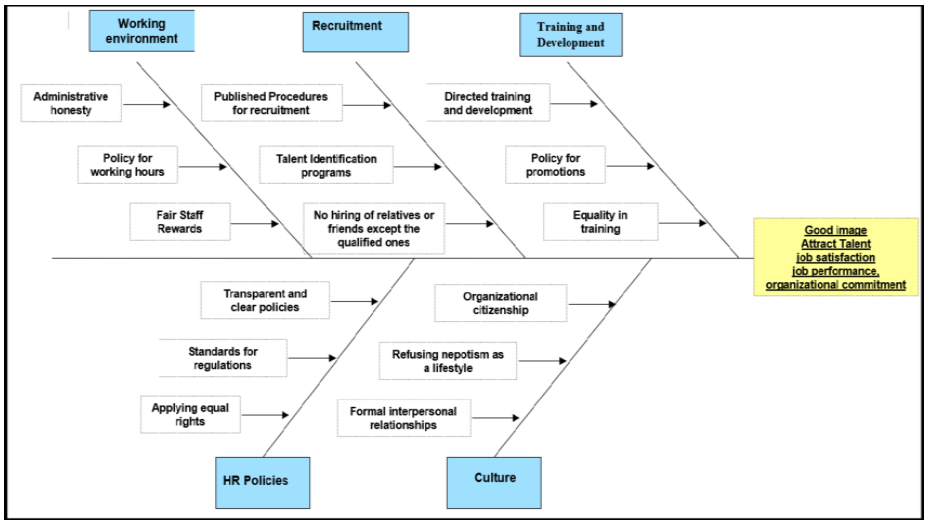

Fig. 1 Ishiwaka Diagram - Source. "Fishbone diagram: Solving problems properly". IONOS Startupguide. Retrieved 2021-12-23.

Once the problems have been analyzed, we give them a possible solution by applying the 5S.

1st step. Seiri (Sort). We classify all machines, materials and utensils in order to eliminate those that are not useful. To know what to do and where to order each item we will use the system of the red cards. These cards serve to identify the problem detected and the proposed action to resolve it.

2nd step Seiton (Set in order). Sort and place things that are frequently used in the places closest to you, almost immediately and things that are least used to keep them in less accessible places. It is very helpful to post signs indicating where things are located inside the house/accommodation.

3rd step. Seiso (Shine). This step is based on cleaning, removing all the dirt from the accommodation with the right products. To this end, a detailed document will be drawn up on how to clean each area, with which products, what steps should be taken and what level of demand should be reached.

4th step. Seiketsu (Standardize). To achieve standardization, the above three steps must be integrated into the daily routine of the accommodation workers and their work habits. This standardization must evolve and improve over time and with the help of workers, hold regular meetings to express new proposals for evolution and add them to the cleaning plan that was initially created.

5th step. Shitsuke (Sustain). At this point, the steps previously applied must be maintained.

We will have to count on the effort, the acquisition of these habits and the will to do so because there is no standard or norm that requires this compliance and engagement.

With regard to Sigma Six, after applying the Ishiwaka diagram, the best methodology would be DMADV, because it applies to existing structures based on the five phases that compose it:

1. Define - define the new process and the respective ones;
2. Measure – identify and measure the process and customer needs;
3. Analyze – analyze options and feasibility;
4. Design – process development in order to satisfy customer needs;
5. Verify – process validation in order to see if it meets the customer's needs (Craveiro, 2020, p. 13).

4. Methodology

This study based on a mixed method approach, employing a literature review, followed by a case study in the Lamego-Douro region with the analysis of the TOP 10 (ten accommodation spaces most sought after by consumers/tourists) in the segment Airbnb.

However, in a longitudinal analysis of the TOP 10, regarding the existing spaces in the region of Lamego – Douro, which make up the sample and according to the literature, we can see that they have focused on investigating some specific aspects associated with the platform, namely:

(1) the reasons for adopting and reusing the service,
(2) impacts on hotels and other accommodation providers,
(3) aspects that lead to the option for a particular offer/ad,

(4) pricing,
(5) transformations caused by the increase in the supply of accommodation based on short-term rentals,
(6) co-creation of value.

Undoubtedly, the proposal to use spaces that were previously unthinkable – such as family homes – for accommodation based on short-term leases broadens and corroborates the 'differentiated' appeal associated with the collaborative movement, which seeks to resignify and change consumption practices. (Botsman & Rogers, 2011) [36].

In the 19 municipalities of the Intermunicipal Community of Douro (CIM) there are 685 accommodations (Figure 2) their number does not depend on the geographic dimension of the municipality but on the availability of supply by local structures.

Municipalities	Accommodations
Vila Real	29
Lamego	19
Alijó	69
Régua	11
Tabuaço	48
Sabrosa	57
São João das Pesqueira	27
Mesão Frio	19
Armamar	19
Torre de Moncorvo	33
Foz Côa	44
Carrazeda	24
Moimenta da Beira	21
Tarouca	94
Sernancelhe	68
Santa Marta de Penaguião	20
Freixo de Espada à Cinta	16
Penedono	36
Murça	31
Total	685

Fig 2. Municipalieties Accomodations- [1]Source: RNT (National Tourism Register) data

[1] The RNT gathers mandatory information filled in and updated by the entities operating the enterprises and tourism companies, tourist entertainment agents and travel and tourism agencies. - https://rnt.turismodeportugal.pt/RNT/_default.aspx

4.1 Case study – Airbnb Douro Lamego

In the Viseu District in Portugal lies the historic parish city of Lamego, which has many important landmarks. Furthermore, the region is home to the scenic Douro River, Douro Valley, and many gorgeous vineyards making it a great destination for tourists. There is so much to see in Lamego such as the stunning gothic Catedral de Lamego, the medieval castle sitting on the mountaintop known as the Castle of Lamego, and the rustic town of Almacave.
Fortunately, the region also has many excellent accommodations. Travelers will also be able to enjoy fantastic views of natural landscapes or important historical landmarks. From the analysis carried out, we can verify that the vacation rentals listed in the top 10 are modest or sophisticated. However, all are tidy and impressive due to their great location, quality and wealth of amenities. The number of accommodation establishments in the Douro is 685.
Impressive and tidy accommodations in the valley.
Douro tourist accommodation NUT-III by municipalities according to Airbnb (fig.2)

Some fundamental questions were asked in these 10 accommodations, which are part of the top 10 in Lamego and which can be solved using the methodologies of the Lean Thinking process. The most relevant are:

(1) Are the values promoted by the Airbnb brand used with all its users in the same way?
(2) What is the guest's perception of the recommendations made by the platform?
(3) What is Airbnb's financial impact on user revenues?
(4) How does this impact affect the income of this type of ecosystem?
(5) What is the role of hosts in the intention to reuse the service?

One of the major limitations of this research was to obtain answers and data on the referenced questions, because most accommodation structures do not have strategic planning and only use the platforms as the basis of digital communication systems.
In this sense, there is still a lot of work to be done to make the service and local production profitable, applying simple methodologies that provide ways to avoid waste and create value.

5. Conclusions

In this way, Lean and Six Sigma are presented as two important tools for the economic sustainability of organizations, in terms of cost reduction and waste elimination. In fact, globalization and the development of markets, in a growing trend between the imbalance between demand and supply, demonstrates this need, in which organizations must seek to be self-sustainable.
At a time when there is a reduction in public funding, it is necessary that local companies that promote tourism services and products make a management taking into account the reduction of costs. Only in this way can they guarantee their sustainability in

the market in which they operate. Thus, with the increasing application of these innovative measures, in several companies of the tourism sector, the accommodation subsector, the increase in productivity and greater customer satisfaction is visible. In view of the methods adopted - "customer satisfaction increased substantially, the cost reduction on waste was enormous and the cost of implementation was more than compensated" (Rodrigues, Schneiders, & Oliveira, 2020, p. 176) [37].

As this is a tool to reduce failures in the production area, it is also relevant to address the issue of time management in the services provided in the accommodation, since this reduction proves to be an indicator of improvement in customer satisfaction, with a reduction in complaints being observed. on the platform.

It is still a way to promote the circular economy, which is still a strategic concept, based on the reduction, reuse, and recovery and recycling of materials and energy.

We were able to verify some of the fundamental aspects that concern the providers of these services. Through table 2 we understand that the reality of this sector in the Douro is representative.

Thus, the waste that these companies may no longer have must be observed, enabling the reduction of unnecessary costs, and these values can be applied in other areas of organizational valorization (Costa, Monteiro, Ribeiro, & Dias, 2019) [38].

In an era where ecosystems and environmental issues are the order of the day, Lean and Six Sigma tools and processes must be adapted to all service and production sectors, creating sustainability, value and avoiding all types of waste.

So we will keep phrases like the ones that appear on the platform – "Check out our amazing list of the top 10 Airbnb vacation rentals in Lamego, Portugal and book your favorite one today!"

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