Application of Lean Principles in Five-Star Hotels in Egypt

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Abstract

The hospitality industry faces the challenge to decrease or eliminate their costs and to be more efficient in the near future. In recent years, the hospitality industry showed growth continuously, applicability to implement Lean in the hospitality and tourism sectors to improve productivity and service quality. Nevertheless, the literature review highlighted there are little hotels and tourism organization implemented Lean in their operation. Reason for that, Lean technique used in a single department of the establishments, which lead to missing the overall approach of Lean.

Globally, the implementation of Lean techniques has proven to be successful in improving quality while reducing turnaround times and costs within the hospitality industry. There appears to be limited publicly available current research regarding Lean implementation in Egyptian hotels, leading to the motivation for this study. Therefore, the aim of this paper is to identify the application of Lean principles in Cairo five-star hotels in Egypt.

This research adopted a quantitative approach to achieve the aim, objectives. A questionnaire was used for data collection. 72.5% was the average response rate. Statistical Package for Social Sciences (SPSS, version 16) program was used for analysing data. The results indicated that awareness and knowledge of the hotel participants about Lean term not clear for them and they did not know its meaning. The results showed that hotels did not implement Lean principles in their operations. A major contribution of this research is related to enhance the understanding of Lean principles. This research added to the growing Lean principles literature through its review of the previous academic research, generation of new ideas and interpretation of rich data collected from the different sources.

Keywords: Lean, Lean principles, Lean tools, Five-star hotels, Egypt.

Introduction

Today, hospitality industry sectors are worked under pressure to improve the quality of their services, achieve their customer satisfaction, improve productivity and reducing costs (Lee et al., 2013). For that, the hospitality sectors are started to implement a Lean philosophy (Roriz et al., 2017). Lean approach is a process that covers different practices which aim to reduce waste and improve operational effectiveness (Rauch et al., 2016). The lean approach was born in the Japanese car manufacturing industry in the 1940s (Ahmed et al., 2016). The concept of Lean was promoted in several companies and has been in place since the early 1990s. The term "Lean" incorporates a set of Lean practices and was first proposed by Womack et al. (1992) (Leite & Vieira, 2015). Urban (2015) reported that the definition of Lean Management is "doing more with less". Lean approach is defined as a system aimed to create good products by using fewer resources, such as people, equipment, space, to do more and offers a variety of choices for users (Rauch et al., 2016). The study of Kim et al. (2010) mentioned that Lean is a production method which aims to achieve customer-perceived value and eliminate all forms of "Muda" (waste) in order to improve a product's efficiency, quality and value. Therefore, Lean philosophy rapidly moved to several new areas including; services, trade and public sector (Womack & Jones, 1997), but, the major implement of Lean approach to the service sector is still little. On the other hand, the availability of literature review of Lean applied in the service sector is still limited (Roriz et al., 2017).

However, the implementation of Lean is considered flexible process and it applicable to use in different areas, but in hospitality and tourism industry Lean approach are not widely implemented and the literature of review highlighted little of examples for the implementation of Lean in hospitality (Rauch et al., 2016). On the other hand, Ahmed et al. (2016) explained that there is a

paucity of published research on the application of Lean in relation to perishable products (i.e. food) and Lean was used in food production as a tool to reduce costs and decrease waste.
As well as, the study of Mohammad (2017) reported that Egyptian hotels did not adopt the Lean approach, in particular in the food and beverage department. As mentioned earlier, there appears to be limited public research regarding Lean implementation within the Egyptian hotels. This work seeks to contribute to addressing this gap, through an investigation of the status of Lean implementation in hotels in Egypt. The overall aim of this paper is to identify the application of Lean principles in Cairo five-star hotels in Egypt, there are three objectives identified: firstly, to identify the awareness and knowledge of Lean term; secondly, to explore the application of Lean principles, thirdly, to identify the importance of Lean applications in five-star hotels in Cairo.

Literature review

Lean in the hospitality industry

The hospitality industry is massive and produces huge quantities of service according to specifications which match product quality with customer needs at a price that customers are willing to pay (Dudbridge, 2011). Lean management seeks to determine the customer value whether or not customers will pay for that step in the process (Irani, 2011), e.g., cleaning room in a hotel is something that a customer may hold valuable. This process of cleaning and preparing room for the customer including several steps which may not add value for the customers (Lancaster, 2011). For that, Lean aimed to eliminate these steps without effect the quality of product and service (Urban, 2015). The hospitality industry seeks to deliver products according to their specification, focusing on suppliers can minimize this variation. From this point, Lean concentrates on monitoring and controlling performance. So, raw materials are one of the factors that make Lean application in the hospitality industry different from any other (Dudbridge, 2011). On the other hand, the study of Rauch et al. (2016) reported that Lean management is applicable to implement in the hospitality industry. Unfortunately, not all Lean tools were suitable to implement in the hospitality area.
H1: There are significant differences between respondents on the awareness level of the Lean term.

Lean management principles

By referring to Oxford dictionary (2010), "Lean" means thin, lack in richness and quantity, economical, sharp and low content. The main idea beyond the Lean concept is to maximize customer's delivered value while minimizing waste. The philosophy of Lean is to deliver a service of high quality at a low cost. To achieve this it is necessary to improve the production process, the quality of the product and the work environment (Lehtinen and Torkko, 2005). Womack and Jones (2003) defined the five principles for Lean as a value, value stream, flow, pull and perfection. Each of these will be discussed in turn:
Principle 1- Value: requires to understand what is of value to the customer (Engelund et al., 2008), and understand his/her requirement (Othman & Ghaly, 2014). As well as, it needs to identify the customer expectations of the product (Sunjka & Murphy, 2014). In addition, Othman and Ghaly (2014) the concept of customer value aimed to identify the internal and external factors that effect on the decision of customers. It also refers to providing a high quality of service at a suitable price which matches customer expectations (Woodruff, 1997), it also means what the customer is willing to pay for getting that value (Lian & Landeghem, 2002). Value can be identified in terms of the activities that add or do not add value to eliminate waste (Dudbridge, 2011).
Principle 2- Value stream: is determining all activities required for the right product (Sunjka & Murphy, 2014). The value stream helps to identify the waste and eliminate it (Kollberg et al., 2006). This step refers to determine the activities and the route of products from start to finish (Saboo et

al., 2014), when done correctly will produce product and service that achieve customer value (Othman & Ghaly, 2014).

Principle 3- Flow: aims to create a constant flow of product without interruptions from start to finish, such as: avoiding any "bottlenecks" or "Batch and queue" (Sunjka and Murphy, 2014). Saboo et al. (2014) and Othman and Ghaly, (2014) reported that this step required that all effort would be made to reduce the barriers that prevent such flow.

Principle 4- Pull: aims to decrease the quantity of material in inventories and applying a "just-in-time" (JIT) strategy which means increasing efficiency and decreasing waste by ensuring the flow of the product from the ordering process until it is distributed to the customer (Kollberg et al., 2006). JIT philosophy delivers the product at the right time and in the quantity required (Sànchez & Pérez, 2001). In addition, this step means that to not producing or delivering anything "upstream" unless it is needed "downstream" (Engelund et al., 2009).

Principle 5- Perfection: is defined as a journey of continuous improvement, it seeks to deliver product and service as the customer needs with a suitable price for them. There are several factors required for perfection process including; adding value, available, adequate, flexible and continuous flow. If one of these factors fails the waste will appear (Othman & Ghaly, 2014; Sunjka & Murphy, 2014).

Lean management tools in hotels

The Lean tools are four, namely: measurable parameter tools; value stream mapping; housekeeping tools (5S - sort; sweep; standardise; simplify; sustain); kaizen tools - as discussed below

Measurable parameter tools

Lean has relationships with other methods used to measure quality, such as; total quality management and Six Sigma, which also aim to deliver high-quality service (Kim et al. (2010). However, there are differences between these tools, e.g. Six-Sigma seeks to achieve the effectiveness based on statistics, and TQM engages in delivering high quality from a customer standpoint by involving all staff in continuous improvement. Lean focuses on the value of the customer and improving the flow of food production from start to finish for reducing waste (Kim et al., 2010; Engelund et al., 2009). Lean use measurable parameter tools to ensure product quality (Näslund, 2008). As well as, it helps to manage the resources to enhance production efficiency and performance by scheduling a short meeting during the production process to identify the workload (Engelund et al., 2009). It is also used to facilitate communication between all staff (Motwani, 2003).

Value-stream mapping tools (VSM)

Lean aims to identify whether the production processes are adding value (or not) from a customer perspective. This tool is used to identify the activities that create non-value/ waste in order to eliminate it (Engelund et al., 2009). Lancaster, (2011) reported that value stream mapping draws the production process step by step starting from design through development and production to distribution. It is considered a great way to improve the effectiveness of food production (Engelund et al., 2009). In addition, Lian and Landeghem (2002) mentioned that "VSM" was the best way to implement Lean.

From a customer perspective many processes do not add value such as handling and moving items and organizing/storage do not add value and add unnecessary costs; in that regard, Dudbridge (2011) declared that inventories are one of the worst sources of inefficiency, so there are several production methods which seek to reduce inventory costs- by reducing the breakdown of

equipment; by regular maintenance and by managing the set up time of production (Sànchez & Pérez, 2001).

The Housekeeping tools 5S

Lean seeks to improve and organize the workplace, reduce unnecessary items and clean the environment, which affects the working environment and employee productivity (Lancaster, 2011). 5S has benefits for both employees and hotels, e.g. high quality, reduced costs, improved safety and equipment (Näslund, 2008). Engelund et al. (2009) mentioned that the main objective of 5S tools is to reduce waste during production activities.

The housekeeping 5S pillars are

Sort is an important process in the hospitality industry, because it organizing and prevent the problems in the workplace, such as broken machines, not used raw materials, removal of any risks from the areas(Dudbridge, 2011).

Sweep is the next step which ensuring the food hygiene requirements in the workplace (Motwani, 2003), through concentrates on cleaning the surface and inspection of all machines a regular basis (Dudbridge, 2011).

Standardise is the best steps for reducing wastage, improving efficiency and achieving output quality (Dudbridge, 2011). This process includes all tasks of housekeeping which depends on taking photos and video recording of mistakes and carries out the task correctly (Lancaster, 2011).

Simplify plays an important role in Lean for ensuring that all equipment and items are in the right place, is easily accessible and reduces the time for searching for the items (Dudbridge, 2011).

Sustain is an ongoing process, 5S is a good process to use in the hospitality industry, it has benefits for food quality, food safety and it can be implemented in the areas around production area (Dudbridge, 2011).

Kaizen tools

A continuous improvement is the main objectives of Lean implementation (Engelund et al., 2009). Kaizen means ‘change for the good’ (Khan, 2011), so the whole meaning is good changes (Venkateswaran, 2011) by regular meetings with employees for taking suggestions that help the hotels to solve problems and improve performance (Näslund, 2008). Furthermore, Sorte (2014) highlighted that a kaizen concentrates on workplace attitudes and includes five elements: quality circles; teamwork; improve morale; personal discipline and suggestions for improvement.

PDCA cycle can be used within the Kaizen concept, a tool for continuous improvement (Gupta & Jain, 2014). In a similar vein, Venkateswaran (2011) claimed that Kaizen tools are based on the adoption of Deming’s PDCA cycle. This cycle used to reduce the gap between customer perceptions and expectations (Sokovic et al., 2010). Effective improvement starts with a plan; do (determine the activities to achieve the plan); check (evaluate the results); act (procedures are taken to improve the process) (Matsuo & Nakahara, 2013).

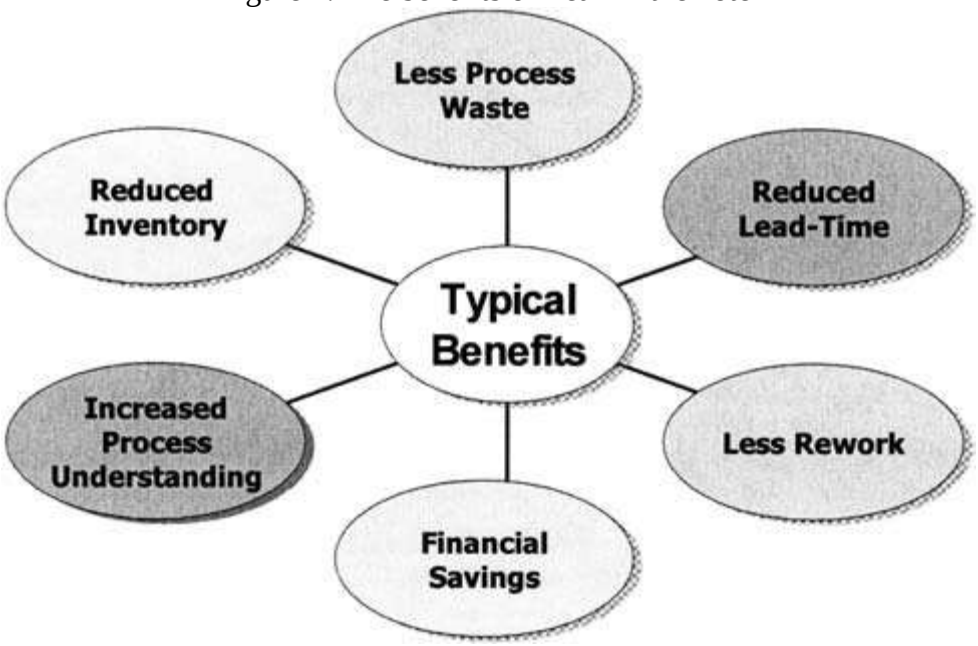
H2: There are significant differences between the respondents on the application of Lean principles in hotels.

The importance of Lean application in a hotel

Generally, Lean adaptation aims to maximize the guest benefit and to minimize the use of the resource. It also offers great value to their guests, to reduce costs and to remain competitive in the hospitality industry. On the other hand, Lean is considered a tool to prevent wastage or unnecessary steps in a process (Engelund et al., 2009). In addition, Lean is also a tool for giving the employee skills to produce a high quality of service to achieve customer needs (Kollberg et al., 2006). Melton

(2005) explained the benefits of implementing Lean are including; less process of waste, reduced lead-time, less rework, financial saving, reduce inventory and increase process understanding.
In hotels, waste is not new and reduce it requires cooperation effort between all staff. Lean principles play a critical role to eliminate the different types of waste (Vlachos & Bogdanovic, 2013). The main rationale of Lean is to remove wastage in all the production steps and considered the core of value stream mapping. Lean guiding principles are putting things right the first time and eliminating waste (Dudbridge, 2011). Lehtinen and Torkko (2005), Melton (2005), Engelund et al. (2009) and Dudbridge (2011) explained different types of waste which are; over-production, inventory (over-stocking), transporting, processing (packing, wrong equipment for job), waiting, motion (moving of people), and defects(see Figure1).
H3: There are significant differences between the respondents on the importance of Lean application in hotels.

Figure 1: The benefits of Lean in the hotel



(Source: Melton, 2005:663)

Methodology

A quantitative approach was used in this research. A questionnaire was used for data collection which considered appropriate methods as the nature of this research was exploratory. This research was adopted in a purposive sample of 33 five-star hotels of Cairo in Egypt (EHA, 2018). Cairo hotels were chosen due to their geographical convenience for the researcher and the researcher has access to these hotels. The reason for selected five-star hotels because it delivers a unique hospitality service in Egypt and due to its well-known reputation, it also offers the best service outcome, as well as putting the customer requirements and their needs first. The questionnaire design was based on the five principles of LEAN that modified by Othman and Ghaly (2014) and Sunjka and Murphy (2014), so the questionnaire was broken into four sections including; the respondent's demographic profiles, the knowledge of Lean, Lean principles including; value, value stream, flow, pull and perfection (see Table1) and the importance of lean application. The first version of the questionnaire was written in the Arabic language and then translated into the English language. A convenience sample technique was chosen for this research. The total number of distributed questionnaires was 400 copies. The final returned questionnaires were 290 copies with

72.5% response rate. Statistical Package for Social Sciences (SPSS, version 16) program was used for analysing data.

Table 1: Framework of Lean principles for the research questions

Lean Principles	Tools which used to measure lean principles	Description
Value	Measurable parameter	- To identify customer values, requirements. - To identify the impact of internal and external factors that affect customer decision.
Value stream	Value stream mapping	- Define all activities and recourses required for the production process. - Organise materials, equipment, tools, and resources for efficient production.
Flow	5S	- Reduce process cycle time through increasing workflow and task organization, by implementing the 5S strategy.
Pull	JIT	- Incorporate all aspects of just-in-time delivery and minimizing materials' movement and relocation.
Perfection	Kaizen	- Training and educating staff to execute the designated role of delivering customer requirements. - Taking corrective actions to respond to defects and retaining those solutions for use in the future.

Results and discussions

Demographic information of respondents

Total of 290 questionnaires was distributed to hotel staff whether in different management level (see Table 2). The gender of respondents was 60.34% (175) males and 27.58% (80) females 12% (35) did not answer this section (missing). The respondents in the managerial level were 6.8% (20) managers and 18.9% (55) of the respondents were supervisors. The largest group of respondents 62% (180%) were employees and 12% (35) did not answer this section (missing) (see Table 2).

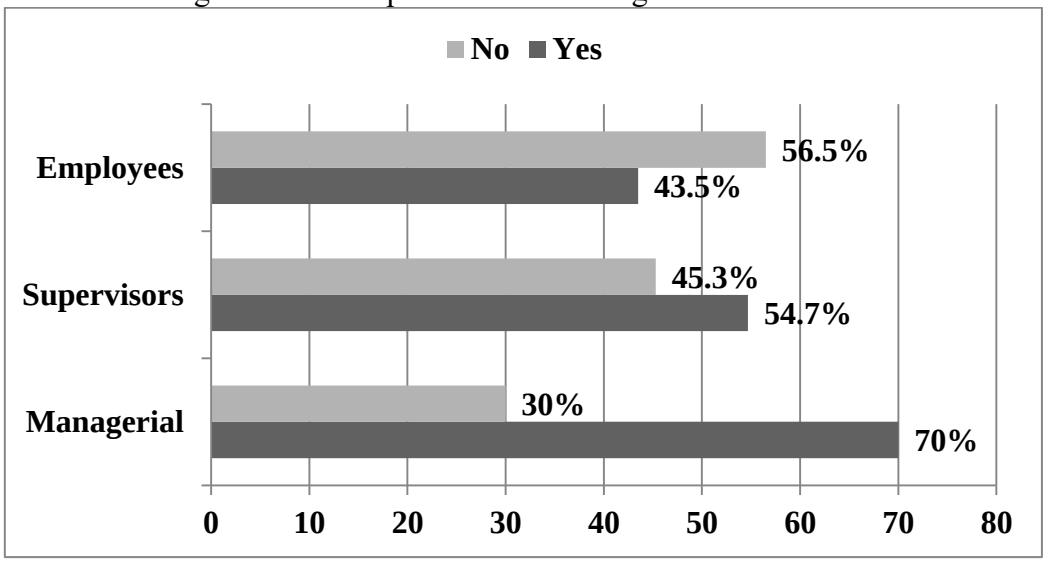
Table 2: Demographic profile

Demographic factors		Frequency (N=290)	Percentages (%)
Gander	Male	175	60.34
	Female	80	27.58
	Missing	35	12
Level of management	Managerial	20	6.8
	Supervisors	55	18.9
	Employee	180	62
	Missing	35	12

The knowledge of Lean

This section of the questionnaire was aimed to determine the knowledge of Lean and whether they have information related to the concept of Lean. Firstly, the respondents were asked if they heard of the Lean term. By analysing the responses to this question it can be concluded that (70%) of the managerial level respondents said yes and (30%) of them said no. (54.7%) of the supervisors level, respondents said yes, while (45.3%) of the respondents said no. Finally, (43.5.3%) of employees level respondents said yes, while (56.5 %) of the respondents said no (see Figure 2).

Figure 2: The respondent's knowledge of the Lean term



The results reported that the majority of the participants had heard of the Lean term but did not know its meaning. Therefore, the results reported that the awareness and knowledge of Lean term is still not clear for the hotel staff which agreed with the study of Roriz et al., (2017) mentioned that the major implement of the Lean approach to the service sector is still little and the availability of literature review of Lean applied in service sector is still limited.

F test/Analysis of variance (ANOVA) was carried out, to identify the variance between the respondents on the awareness of Lean term. Results for significance regarding the purposes of this study were based on a $P \leq 0.05$ confidence level. Also, the ANOVA test was selected to compare group means and discover group differences. The results indicated there was statistically significant between the study participants on the knowledge of Lean term, $F(1, 289) = 5.122$, $p = 0.026$ (see Table 3).

Table 3: Results of One-Way analysis of variance test comparing the opinions of the respondents on the knowledge of Lean term.

	Sum of Sq.	DF	Mean Square	F	Prob.
Between Groups	2.159	1	2.159	5.122	0.026*
Within Groups	97.279	289	0.425		
Total	99.437	290			

*Significant at the 0.05 alpha level.

Therefore, the null hypothesis was not accepted while the alternative hypothesis was accepted. The alternative hypothesis declares that there are significant differences in the respondents' answers on the knowledge of Lean term.

Lean principles in hotel

In the context of Lean principles, Womack and Jones (2003) defined the five principles for Lean will be discussed below;

Value

The following table 4 showed that, the mean scores for about the first principle of Lean "Value". The results indicated that, the mean scores for this principle range from 4.12 to 4.45. The variance for the responses to the items measuring it was 0.62 "less than 1" which means that there are no significant variations among means, and the standard deviation was 0.68. The Cronbach Alpha

internal reliability measure was acceptable as 0.70. The results reported that the grand mean of value principle variables were 4.29, comparing that mean with the 5-point of Likert scale strongly disagree (1), disagree (2), neutral (3), agree (4), strongly agree (5), The results reported that the mean of value principle is situated in the choice number (4) agree. Therefore, it showed the agreement of the participants that they followed this step to identify the customer need and requirements.

Table 4: Statistics of Lean principle "Value" variables in hotels

Value principle variables in hotel	Mean	Variance	Std. Deviation
1- We identify the customer whether internal or external.	4.12	2.25	0.69
2- We have a formal method for determining customer needs.	4.20	1.70	0.77
3- The hotel measure customer satisfaction for service delivered.	4.38	1.80	0.75
4- We delivering a high standard of service with a suitable price	4.26	0.96	0.67
5- We identify the customer needs and provide them with a suitable product.	4.35	1.15	0.69
6-We identify customer expectations and requirements before serving delivered.	4.45	0.18	0.88
Statistics for all Variables	4.29	0.62	0.68

The literature review revealed that Lean requires understanding what is of value to the customer (Engelund et al., 2009). Value needs to identify the customer expectations of the product (Sunjka & Murphy, 2014). In addition, Othman and Ghaly, (2014) the concept of customer value aimed to identify the internal and external factors that effect on the decision of customers. This reflecting the current study results, which revealed that the study sample was agreed that the “value” principle and they implemented these steps in their hotels but they did not it as one of Lean principle.

Value stream mapping

Respondents were asked whether their hotels used the second principle of Lean “value stream mapping”. The results indicated that, the mean scores for this principle range from 3.25 to 4.60. The variance for the responses to the items measuring it was 0.69 "less than 1" which means that there are no significant variations among means, and the standard deviation was 0.70. The Cronbach Alpha internal reliability measure was acceptable as 0.80. The results reported that the grand mean of value stream mapping variables were 3.86, comparing that mean with the 5-point of Likert scale strongly disagree (1), disagree (2), neutral (3), agree (4), strongly agree (5), The results reported that the mean of value principle is situated in the choice number (3) neutral and the choice number (4) agree and more closed to the choice number (4) agree. As it is more than 3.5; which mean that the participants were agreed with the principle of value stream mapping (see Table 5). This result coincides with Kim et al. (2006) the value stream mapping is used to identify the product route from start to end and explores the different types of waste that appear during the production and tries to eliminate it (Kollberg et al., 2006). As well, Lancaster (2011) reported that there are several steps that do not add value to the customer, so value stream is used to identify the activities that create non-value and tries to eliminate them.

Table 5: Statistics of Lean principle "Value stream mapping" variables in hotels

Value stream mapping variables in hotel	Mean	Variance	Std. Deviation
1- In our hotel, the reference point for most of the activities within the hotel is the value stream.	3.25	2.05	1.40

2- It is sought to obtain a continuous and smooth flow in the value stream.	3.36	1.50	1.20
3- The hotel aims to deliver service according to customer orders.	3.55	1.45	0.76
4- We defining all activities and recourses required for production.	4.58	0.96	0.54
5- We organize and structure job site materials, equipment, tools, and resources for efficient work execution.	4.60	0.35	0.62
Statistics for all Variables	3.86	0.69	0.70

Flow

Table (6) showed statistics (means, variances, std. deviations) of the third principle of Lean "flow". The results indicated that, the mean scores for this principle range from 3.39 to 4.50. The variance for the responses to the items measuring it was 0.45 "less than 1" which means that there are no significant variations among means, and the standard deviation was 0.66. The Cronbach Alpha internal reliability measure was acceptable as 0.77. The results reported that the grand mean of flow principle variables were 3.69, comparing that mean with the 5-point of Likert scale strongly disagree (1), disagree (2), neutral (3), agree (4), strongly agree (5), The results reported that the mean of value principle is situated in the choice number (3) neutral and the choice number (4) agree and more closed to the choice number (4) agree. As it is more than 3.5; which mean that the participants were agreed with the principle of flow.

Table 6: Statistics of Lean principle "Flow" variables in hotels

Flow Variables in hotel	Mean	Variance	Std. Deviation
1- We divide time of production according to client demand.	4.50	1.55	0.57
2- We organise our working place to reduce the risks during the working day.	3.39	1.70	1. 30
3- We put all equipment tool in place and we take out any equipment not being used which impacts on workflow.	3.61	0.70	1.20
4- We keep the production area clean.	4.05	2.31	0.82
5- The personal hygiene was in place.	3.50	1.52	1.50
6- We have regular checks for all equipment to keep the workflow going on without any problems during the production process.	3.40	0.76	0.82
7- We ensure that all equipment in the right place.	3.44	1.66	1.30
Statistics for all Variables	3.69	0.45	0.66

This previous classification is agreed with the literature review, this principle aims to creates a constant flow of product without interruptions from start to finish, such as: avoiding any "bottlenecks" or "Batch and queue" (Sunjka and Murphy, 2014). It seeks to improve and organise the workplace, reduces unnecessary items and cleans the environment, which affects the working environment and employee productivity (Lancaster, 2011). 5S has benefits for both employees and hotels, e.g. high quality, reduced costs, improved safety and reduce waste (Näslund, 2008; Engelund et al., 2009).

Pull

Results indicated that, the mean scores of the Lean principles "Pull" range from 3.06 to 3.67. The variance for the responses to the items measuring it was 0.37 "less than 1" which means that there are no significant variations among means, and the standard deviation was 0.60. The Cronbach Alpha internal reliability measure was acceptable as 0.72. The results reported that the grand mean of Lean principle "Pull" variables was 3.42. Comparing that grand mean to the 5-point Likert scale strongly disagree (1), disagree (2), neutral (3), agree (4), strongly agree (5) showed that, this means is situated between the choice number (3) neutral and the choice number (4) agree and more closed to the choice number (3) neutral. As it is less than 3.5; which mean that the participants don't know anything about this principle "Pull" (see Table 7).

However, the literature review highlighted that JIT philosophy delivers the product at the right time and in the quantity required (Sànchez & Pérez, 2001). In addition, it means that to not producing or delivering anything "upstream" unless it is needed "downstream" (Engelund et al., 2009). But the results reported that the respondents did not have an idea about this principle.

Table 7: Statistics of Lean principle "Pull" variables in hotels

Pull Variables in hotel	Mean	Variance	Std. Deviation
1- We adapted JIT philosophy to delivers the product at the right time and in the quantity required.	3.67	0.69	0.8
2-We minimizing materials' movement and relocation to reduce waste.	3.09	0.21	0.5
3- We keep the production system flexible and adaptable to customer requirements and future changes.	3.34	0.35	0.7
4- We exercise a conscious effort at shortening lead and cycle times.	3.61	0.36	0.6
Statistics for all Variables	3.42	0.37	0.60

Perfection

The following table (8) showed that, the mean scores for about the principle of Lean "perfection". The results indicated that, the mean scores for this principle range from 3.37 to 4. The variance for the responses to the items measuring it was 0.31"less than 1" which means that there are no significant variations among means, and the standard deviation was 0.60. The Cronbach Alpha internal reliability measure was acceptable as 0.75. The results reported that the grand mean of perfection variables were 3.71, comparing that mean with the 5-point of Likert scale strongly disagree (1), disagree (2), neutral (3), agree (4), strongly agree (5), the results reported that the mean of perfection principle is situated in the choice number (3) neutral and the choice number (4) agree and more closed to the choice number (4) agree. As it is more than 3.5; which mean that the participants were agreed with the Lean principle "perfection". This is matched with the study of Vlachos, (2005) and Yamagar and Ravanan, (2010) continuous improvement is considered one of the basic pillars of Lean implementation which means never-ending the efforts to eliminate the root cause of the waste problem. On the other hand, Venkateswaran (2011) claimed that Kaizen tools are based on the adoption of Deming's PDCA cycle.

Table 8: Statistics of Lean principle "Perfection" variables in hotels

Perfection variables in hotel	Mean	Variance	Std. Deviation
1- Strategic goals seat for the hotel.	3.42	2.39	1.6
2-Formal method of continuous improvement in place	3.79	1.65	1.3
3-Training and educating staff to execute the designated role of delivering customer requirements.	4	1.05	1

4-We have Effective improvement process starts with a plan; do (determine the activities to achieve the plan); check (evaluate the results); act (procedures are taken to improve the process).	3.37	1.62	1.3
5- Taking corrective actions to respond to defects and retaining those solutions for use in the future	3.98	0.93	1
Statistics for all Variables	3.71	0.31	0.60

F test/Analysis of variance (ANOVA) was carried out, to identify the variance between the respondents on the application of Lean principles in their hotels. Results for significance regarding the purposes of this study were based on a $P \leq 0.05$ confidence level. Also, the ANOVA test was selected to compare group means and discover group differences. The results indicated there was statistically significant between the participants on the application of Lean in hotels, $F(1, 264) = 7.2249$, $p = 0.000$ (see Table 9).

Table 9: Results of One-Way analysis of variance test comparing the opinions of the respondents on the application of Lean principles in hotels.

Source of Variation	Sum of Square	DF	Mean Square	F	Prob.
Between Groups	508.2397	1	1.8685	7.2249	0.0000*
Within Groups	774.2857	264	0.4727		
Total	780.10967	265	0.6715		

*Significant at the 0.05 alpha level.

Therefore, the null hypothesis was refused and the alternative hypothesis was accepted which declared that there are significant differences between the respondents' answers on the application of Lean principles in their hotel.

Importance of Lean application in a hotel

The following table (10) showed that, the mean scores for the importance of Lean application range from 3.56 to 4.35. The variance for the responses to the items measuring it was 0.39 "less than 1" which means that there are no significant variations among means, and the standard deviation was 0.179. The Cronbach Alpha internal reliability measure was acceptable as 0.80. The results reported that the grand mean of the importance of Lean application variables were 4.04, comparing that mean with the 5-point of Likert scale strongly disagree (1), disagree (2), neutral (3), agree (4), strongly agree (5), this means is situated in the choice number (4) agree. The major importance issues of Lean application were identified as; improve quality of service (M=4.35, V=1.15 and SD=1.01); increase Employee productivity (M=4.20, V=1.74 and SD=1.32); reduce inventory (M=4.16, V=1.01 and SD=1.22); achieve customer satisfaction (M=4.15, V=0.95 and SD=1.05); less rework (M=4.11, V=1.05 and SD=1.02); financial saving (M=4.05, V=1.49 and SD=1.30); increase process understanding (M=3.90, V=1.12 and SD=1.07); less process of waste (M=3.88, V=1.39 and SD=1.28); and reduced lead-time (M=3.56, V=1.64 and SD=1.24).

This result was matched with the literature review which revealed that Lean play an important role are including; offers great value for guests, reduce costs, remain competitive (Dudbridge, 2011), tool to prevent wastage or unnecessary steps in a process (Engelund et al., 2009), tool for giving the employee skills to produce high quality of service, achieve the customer satisfaction (Kollberg et al., 2006), less process of waste, reduced lead-time, less rework, financial saving, reduce inventory and increase process understanding (Melton, 2005).

Table 10: Results of the importance of Lean application in a hotel

Importance of Lean application in a hotel	Mean	Variance	Std. Deviation
1- Less process of waste	3.88	1.39	1.28
2- Reduced lead-time	3.56	1.64	1.24
3- Less rework	4.11	1.05	1.02
4- Financial saving	4.05	1.49	1.30
5- Reduce inventory	4.16	1.01	1.22
6- Increase process understanding	3.90	1.12	1.07
7- Improve the quality of service	4.35	1.15	1.01
8- Increase Employee productivity	4.20	1.74	1.32
9- Achieve customer satisfaction	4.15	0.95	1.05
Statistics for all Variables	4.04	0.39	0.197

F test/Analysis of variance (ANOVA) was carried out, to identify the variance between the respondents on the importance of Lean principles application in the hotel. Results for significance regarding the purposes of this study were based on a $P \leq 0.05$ confidence level. Also, the ANOVA test was selected to compare group means and discover group differences. The results indicated there was statistically significant between the participants on the importance of Lean application in hotels, $F(1, 264) = 47.7691$, $p = 0.000$ (see Table 11).

Table 11: Results of One-Way analysis of variance test comparing the opinions of the respondents on the application of Lean principles in hotels

Source of Variation	Sum of Square	DF	Mean Square	F	Prob.
Between Groups	376.8566	1	1.3906	47.7691	0.0000*
Within Groups	527.1429	264	0.3230		
Total	903.9995	265	2.5716		

*Significant at the 0.05 alpha level.

Therefore, the null hypothesis was not accepted while the alternative hypothesis was accepted. The alternative hypothesis declares that there are significant differences in the respondents' answers on the importance of Lean application in hotels.

Summary and conclusion

To sum up, the results indicated that knowledge of Lean term is still not clear for the hotel staff, however, some of the participants mentioned that they have heard of the Lean term but they did not know its meaning and they did not have any knowledge about it. The results of the study reported that hotels did not implement Lean principles in their operations. It also, the participants didn't have an idea about these principles.

However, the results also showed that the procedures of the majority of Lean principles which including; value, value stream mapping, flow, pull and perfections were followed in the hotel operations, but not under Lean principles. The results showed that implementing Lean principles in hotels achieve several benefits such as; less process of waste, reduced lead-time, less rework, financial saving, reduce inventory and increase process understanding, add value for the customer, improve service quality, improve employee productivity, and achieve customer satisfaction.

This research has a number of limitations: getting access to the primary sources of data was not easy; it was very difficult and challenging matter. This research was carried out in only five-star hotels in Cairo, the research areas did not include all five-star hotels in Egypt; the literature showed

there had been a clear lack of prior research studies on the Lean application in Egyptian hotels. Future research should address more hotels in Egypt.

References

Ahmed, M., Jones, E., Redmond, E., Hewedi, M., Wingert, A., & Gad El Rab, M. (2015). Food production and service in UK hospitals. International journal of health care quality assurance, 28(1), pp.40-54.

Dictionary, O. (2010). UK: Oxford University Press.

Dudbridge, M. (2011). Handbook of lean manufacturing in the food industry, 1st ed., Wiley-Blackwell Publishing Ltd., London.

EHA. (2018). Egyptian Hotel Association, Egyptian Hotel Association: Egypt.

Engelund, E.H., Breum, G., & Friis, A. (2009). Optimisation of large-scale food production using lean manufacturing principles. Journal of Foodservice, 20 (1), pp. 4-14.

Gupta, S., & Jain, S.K. (2014). The 5S and kaizen concept for the overall improvement of the organization: a case study. International Journal of Lean Enterprise Research, 1(1),pp.2240.Https://static1.squarespace.com/static/5a60c3cc9f07f58443081f58/t/5ab3af831ae6cffd4ce1975b/1521725330087/11668_20131114revisedleanresearchreport-DEFR01270FO0425_from_defra_website.pdf (Accessed 21/ 06/ 2018).

Irani, S. (2011). Choosing what works. Industrial Engineer, IE, 43(8), pp.42-47.

Khan, I.A. (2011). KAIZEN : The Japanese strategy for continuous improvement. VSRD International Journal of Business & Management Research, 1(3), pp. 177–184.

Kim, K., Kim, M., & Lee, K.-E. (2010). Assessment of foodservice quality and identification of improvement strategies using hospital foodservice quality mode. Nutrition Research and Practice, 4 (2), pp. 163-172.

Kollberg, B., Dahlgaard, J.J. and Brehmer, P.O. (2006). Measuring lean initiatives in healthcare services: issues and findings. International Journal of Productivity and Performance Management, 56(1), pp.7-24.

Lancaster, J.M. (2011). Lean and Six Sigma in Hospitality Organizations: Benefits, Challenges, and Implementation.

Lee, P., Fryer, A., Eatherley, D., Bojczuk, K., Kivinen, E., & Cox, J. (2013). The role of Lean thinking in increasing resource efficiency in the UK food and drink supply chain.

Lehtinen, U., & Torkko, M. (2005). The lean concept in the food industry: a case study of contract a manufacturer. Journal of Food Distribution Research, 36 (3), pp. 57-67.

Leite, H.D.R., & Vieira, G.E. (2015). Lean philosophy and its applications in the service industry: a review of the current knowledge. Production, 25(3), pp.529-541.

Lian, Y.-H., & Landeghem, H.V. (2002). An application of simulation and value stream mapping in lean manufacturing, Presented at the Proceedings 14th European Simulation Symposium, SCS Europe BVBA, Vol. 14th.

Matsuo, M., & Nakahara, J. (2013).The effects of the PDCA cycle and OJT on workplace learning. The International Journal of Human Resource Management, 24(1), pp. 195–207.

Melton, T. (2005). The benefits of lean manufacturing: what lean thinking has to offer the process industries. Chemical engineering research and design, 83(6), pp.662-673.

Mohammad, A.A. (2017). Approaching the Adoption of Lean Thinking Principles in Food Operations in Hotels in Egypt. Tourism Review International, 21(4), pp.365-378.

Motwani, J. (2003). A business process change framework for examining lean manufacturing: a case study. Industrial Management & Data Systems, 103 (5), pp. 339-346.

Näslund, D. (2008). Lean, six sigma and lean sigma: fads or real process improvement methods?. Business Process Management Journal, 14 (3), pp. 269-287.

Othman, A.A., & Ghaly, M.A. (2014). Lean principles: an innovative approach for achieving sustainability in the Egyptian construction industry. Organization, technology & management

Rauch, E., Damian, A., Holzner, P., & Matt, D.T. (2016). Lean Hospitality-Application of Lean Management methods in the hotel sector. Procedia CIRP, 41, pp.614-619.

Roriz, C., Nunes, E., & Sousa, S. (2017). Application of Lean Production Principles and Tools for Quality Improvement of Production Processes in a Carton Company. Procedia Manufacturing, 11, pp.1069-1076.

Saboo, A., Garza-Reyes, J.A., Er, A., & Kumar, V. (2014). A VSM improvement-based approach for lean operations in an Indian manufacturing SME. International Journal of Lean Enterprise Research, 1(1), pp.41-58.

Sànchez, A.M., & Pérez, M.P. (2001). Lean indicators and manufacturing strategies. International Journal of Operations & Production Management, 21(11), pp. 1433-1451.

Sokovic, M., Pavletic, D., & Pipan, K.K. (2010). Quality improvement methodologies – PDCA Cycle, RADAR Matrix, DMAIC, and DFSS. Journal of Achievements in Materials and Manufacturing. 43 (1), pp. 476–483.

Sorte, W.F. (2014). Standardisation for incremental innovation: a case study in the Brazilian automobile industry. International Journal of Lean Enterprise Research, 1(1), pp.81-93.

Sunjka, B.P., & Murphy, S.F. (2014). Lean implementation within South African aircraft maintenance organizations. International Journal of Lean Enterprise Research, 1(1), pp.59-80.

Urban, W. (2015). The lean management maturity self-assessment tool based on organizational culture diagnosis. Procedia-Social and Behavioral Sciences, 213, pp.728-733.

Venkateswaran, S. (2011). Implementing lean in healthcare warehouse operations evaluation of 5s best practice, Louisiana State University.

Vlachos, I., & Bogdanovic, A. (2013). Lean thinking in the European hotel industry. Tourism Management, 36, pp.354-363.

Vlachos, I. (2015). Applying lean thinking in the food supply chains: a case study. Production Planning & Control, 26(16), pp.1351-1367.

Womack, J.P., & Jones, D.T. (2003). Lean thinking: banish waste and create wealth in your corporation, Simon & Schuster UK Ltd, London.

Womack, J.P., & Jones, D.T. (1997). Lean thinking-banish waste and create wealth in your corporation. Journal of the Operational Research Society, 48(11), pp.1148-1148.

Woodruff, R.B. (1997). Customer value: the next source for competitive advantage. Journal of the Academy of Marketing Science, 25 (2), pp. 139–153.

Yamagar, A.C., & Ravanan, P.M. (2010). Material management by lean manufacturing principles a case study", Presented at the Proceedings of the 2nd International Conference on Manufacturing Engineering, Quality and Production Systems