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Implementation of Lean-Kaizen in Saudi Arabian Higher Education Sector

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Abstract*: The Lean-Kaizen has been utilized in different sectors over the past years as a continuous improvement tool and wastes elimination to gain competitive advantage. Indeed, Lean- Kaizen implementation in the higher education sector has not been employed effectively in some countries. The paper aims to examine the current status of Lean-Kaizen implementation in the Saudi Arabian higher education sector. The survey was distributed to several universities in Saudi Arabia and the findings of the survey illustrated that the implementation of Lean-Kaizen is still in the early stages and not adopted widely in universities within Saudi Arabia. The paper provides valuable information about the current status of the Lean - Kaizen implementation in the Saudi Arabian higher education sector. A recommendation was proposed to guide universities and practitioners for future continuous improvement efforts.

Keywords: Lean Kaizen, Six Sigma, Higher Education

I. INTRODUCTION

Nowadays, organizations worldwide are concerned with improving the quality of products and services to satisfy customer needs. The lean tools, principles, and methodologies are utilized as a continuous improvement process and have been implemented effectively by many leading companies across the world to reduce cost, waste, increase profit, and gain a competitive advantage within the market place (Balzer et al., 2016). Lean thinking or lean manufacturing is an improvement technique, which helps in identifying waste known as (muda), (mura), and (muri) in the Japanese language as well as non-value-added activities that occurred in the work process to provide value to the customer (Ohno, 1988; Pedersen & Huniche, 2011). According to Imai (2006) Kaizen means continuing improvement in every aspect of life by involving everyone in the continuous improvement process. The concept of lean has a major role in Japan's competitive success (Imai, 1986). Previous studies indicated that the use of lean tools leads to a significant reduction in terms of cost, inventories, lead times, and capacity (Hopp & Spearman (2004). Furthermore, several studies have presented the positive impact of lean principles in the higher education sector. The benefits of adopting lean principles in higher education include potential improvement in academic and administrative operations at both the department level and the entire institution. Moreover, it improves quality through reduction of defects, paper cost, cycle time, error rate, process steps, and wait time (Balzer et al., 2016; Behm et al.2010, Womack and Jones, 2003).

Indeed, Lean-Kaizen concept has rarely been applied in most of the Saudi organizations. Moreover, the Saudi higher education sector has experienced significant changes in recent years because increasing numbers of educational universities and institutes that offer new majors' programs to students with greater emphasis on providing better education services. Universities aim to obtain a higher global ranking, meet job market needs and compete nationally and internationally. Because education has a major role in the economic transformation, the Kingdom of Saudi Arabia Vision 2030 has been announced by the government in 2016 for creating a knowledge-based economy, equity of access to education, improve fundamental learning outcomes and improve the quality of public services including education. The vision includes three basic themes (vibrant society, thriving economy, and ambitious nations) and classified into sub strategic objectives to enable effective implementation. The Ministry of Education is currently working on the implementation of several strategic plans to improve the ranking of Saudi universities and to ensure alignment of educational programs outputs with labor market needs (Government, 2016). Although Lean Kaizen has been utilized in developed countries, its implementation and popularity in developing countries have not gained much attention. Moreover, little academic research has been found on the extent of Lean Kaizen implementation in the higher education context. Consequently, the paper aims to examine the current status of Lean-Kaizen implementation in the Saudi Arabian higher education sector. To achieve the overall research aim, the study attempts to answer the following question: RQ1. What is the current status of Lean Kaizen implementation in the Saudi Arabian higher education sector? The following section provides a summary of the literature review of the Kaizen approach followed by the research methodology, which includes research questions, sample selection, data collection, and analysis. Next, the results from the present study and discussion of the research findings are explained. Finally, the paper outlines the concluding remarks, limitations, and future work.

II. LITERATURE REVIEW

Lean is a continuous improvement (CI) process that includes a set of practices and eliminating all aspects of waste and maximizing efficiencies (Womack et al.,1990, Maleyeff et al., 2012).

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The lean concept was applied first by the Japanese in the manufacturing sector and derived from the Toyota Production System (TPS) in 1990. Lean is defined by Hopp and Spearman (2004) as a continuous improvement process to minimize cost and reduce time, which results in achieving lower inventory levels, or capacity. According to Krafcik (1988) Lean is a tool used in manufacturing to reduce human effort, overcome limited space, utilize tool investment, and engineering. The main idea of Lean is to minimize waste and non-value-added activities (Azid et al., 2020, Vinodh et al., 2012; Womack and Jones, 2003). Lean principles include three elements value identification, waste elimination, and smooth flow generation (Womack et al., 1990). In contrast, Liker (2004) grouped 14 principles of lean into four main categories, which are philosophy, process, people, and problem. Different types of waste can be identified in the workplace, namely lead time, motion, inventory, rework, and defects (Chakravorty and Shah, 2012; Vinodh et al., 2011).

Womack and Jones (1996) outlined five principles of Lean, which are defining the value that matches with customer needs, identifying the value stream for each step in the process, analyzing the flow of the process continuously, adopting pull concept, which is based on demand and products are made to order, and achieving an optimal state of the processes that leads to satisfing customer needs. Collier and Evans (2009) illustrated eleven lean tools that can be used to enhance quality, productivity, and reducing costs. These are Just In Time (JIT) and the 8 wastes, the pull system, intelligent automation (Jidoka), mistake-proofing (Poka-Yoke), signboard (Kanban), (Sort-Set-Shine-Standardize-Sustain) (5S), assembly line balancing, standardized component, Value stream mapping (VSM), Total Productive Maintenance (TPM), and continues improvement (Kaizen). The Lean-Kaizen was proposed by the Japanese author Masaaki Imai in 1997. The word Kaizen includes two Japanese words: (kai) means change, whereas (zen) meaning to improve (Imai, 1997). Kaizen is a lean tool and used as a continuous improvement principle. It can be applied in the workplace and aimed at significant improvements to increase quality, improve productivity, reduce costs, and on-time delivery (Alcaraz et al.,2016). Previous studies showed that Lean-Kaizen has a major role in reducing waste and, improving work performance, and increasing innovation.

A. Lean Kaizen in HE

Lean concept has been utilized in the higher education sector in response to the increased coemptions among universities around the world. Balzer (2010) defined lean in higher education (LHE) as the identification of the process's values, process flow, elimination of the types of waste that add no value, smooth processes flow, and achieve perfection through continuous improvement and radical transformation. Finn and Geraci (2012) stated that the use of LHE leads to time-saving, resource utilization, quality improvement of processes, and an increase in employee satisfaction. Additionally, George (2003) stated that the implementation of LHE result in reducing costs to 50 percent, and errors to 60-90 percent.

Many studies have identified different lean tools, which can be used to reduce waste in higher education.

Jorn Dahlgaard (2000) demonstrated eight types of waste in higher education including lack coordination of teaching, coaching, and testing, which leads to students fail in the exams, students unemployment due to lack of learning capabilities, poor scheduling of courses because of inappropriate qualifications of students to pass, courses that do not add value to students, bad planning and mistakes in teaching, coaching and testing, which result in wasting, not providing enough materials and facilities for teaching, long waiting time for accomplishing the activities, and inappropriate design of courses and supportive activities that not meeting the students and firm's needs. In contrast, Lareau (2003) identified four types of waste in higher education. First, people waste as a result of not succeeding in providing knowledge skills to students and employers. Second, process waste due to the lack of classification of wastes, improper design, and undefine university processes; Third, information waste that refers to information that is not supporting the education processes. Fourth, asset waste, which is not an effective use of university resources. Comm and Mathaisel (2005) provided four recommendations to implement LHE, which includes educating employees about the importance of the lean concept, following five principles of lean as proposed by Womack and Jones (1996), identifying metrics for successful implementation of Lean, adopting outsourcing, technology, and collaboration with other educational institutions to become more sustainable. A review of previous research revealed that the concept of the LHE is still evolving. Several educational institutions have used the term 'Lean University' for continuous improvement and quality excellence (Hines & Lethbridge, 2008; Moore et al., 2007). According to Balzer (2010) implementation of Lean principles and practices in the universities provides high efficiency, cost reduction, and significant improvement in processes and services. This can be achieved by redesigning the work, eliminating wastes trough identifying non-value activities. For example, Bargerstock and Richards (2015) applied kaizen methods with DMAIC to improve academic assessment processes. The study results were reduced cycle time by around 67%, removed non-value-added activity steps, increased compliance rates, and discovered additional customer value. Balzer et al. (2016) examined the academic literature on the use of lean in higher education and illustrated the benefits of kaizen principle in higher education. The main findings were significant improvements in the department/unit level and the entire institution. Nadeau (2017) examined the uses of the lean, six sigma, and lean six sigma approach in universities in different countries and demonstrated basic tools of lean such as kaizen, value stream, 5S. This results in improving administrative efficiency and the overall quality of the education received by the students.

Chen (2018) focused on applying several Lean principles and practices including kaizen concept in the design, development, and delivery of the course curriculum. The study concluded that the effectiveness of integrating tools and models in calculation and application, to utilize Kaizen in the service sector. Table I shows a summary of studies related to Lean-Kaizen in Higher Education.

Table I: of studies related to Lean-Kaizen in Higher Education

Authors	Kaizen tools and applications	Main findings
Emiliani (2005)	Outlined the application of Lean-Kaizen in traditional classroom education to improve the course content and curriculum	Kaizen was utilized to clarify of course syllabus, improve course format, course description, and avoid duplicating of teaching material.
Sandmann et al. (2006)	Described benefits of Kaizen blitz approach to improvements in a continuing education department	Kaizen Blitz methodology results in process improvement that produced operational innovation and learning
Kress (2008)	Described key principles of Lean thinking and steps that should be implemented to improve shelving turnaround by using kaizen and a variety of Lean tools	Continuous improvement leads to defined value, waste, and reduction in percentage of searches found in pre-shelving areas
Suárez-Barraza, Ramis-Pujol, Kerbache (2011)	Analyzed Kaizen in the academic and practitioner literature	Categorized kaizen into three different perspectives and guiding principles
Doman (2011)	Utilized lean principles and practices to improve higher education administrative processes using lean key tools such as, value stream, 5S, brainstorming, team building, value stream mapping and the A3 report.	Lean principles and practices can be applied in education sector through involving undergraduate students, which leads to improve university administrative processes and provides an opportunity for universities to create great learning experiences
Barraza and González (2015)	Described the systematic application of Kaizen and its learned lessons learned in Operations Management course	Kaizen is implemented successfully in a graduate course and improve key elements of the teaching–learning process in an Operations Management course.
Bargerstock and Richards (2015)	Applied kaizen methods with DMAIC to improve academic assessment processes.	Reduced cycle time by around 67%, removed non-value-added activity steps, increased compliance rates, and discovered additional customer value
Waterbury (2015)	Studied the challenges faced and lessons learned of implementing Lean in higher education and represented the steps and activities to consider when conducting a Kaizen even	Provided insights from seven colleges and universities who have experience with implementing Lean in higher education
Balzer, Brodke, Kizhakethalackal (2015)	Provided literature on organizational change and transformation to implement kaizen and other lean tools in higher education	Demonstrated recommendations for implementing lean in higher education and addressed the importance of lean techniques. Assessing and improving institutional readiness, enhancing leadership awareness, understanding, and support for the, strategic planning, lean leadership, and getting help for the facilitating an institution-wide transition
Douglas et al. (2015)	Identified eight wastes of lean for Higher Education Institutions (HEIS) and demonstrated methods of eliminating wastes using different kaizen tools	The lean tools used to identify wastes are 5S, point-of-use-storage , process mapping/value stream mapping and level scheduling
Pedersen, Ziegler & Holt (2015)	Developed a train-the-trainer approach in distance education for process improvement and included Kaizen events in the training program.	Improve the learning experience for students, drive innovation, reduce costs, and increase internal effectiveness
Sunder (2016)	Discussed different constructs of quality in HE including Kaizen and identified the success and shortcomings of various quality constructs	The opportunities for future research for imbibing quality culture in HE.
Balzer et al. (2016)	Examined the academic literature on the use of lean in higher education and illustrated the benefits of kaizen principle in higher education	Significant Improvements in the department/unit level and the entire institution
Narayanamurthy, Gurumurthy & Chockalingam (2017)	Developed a framework that can be used for the implementation of LT in an educational institute using kaizen and other LT tools and techniques	LT is a potential tool for improving processes.
Nadeau (2017)	Examined the uses of the lean, six sigma, and lean six sigma approach in universities in different countries and demonstrated basic tools of lean such as kaizen, value stream, 5S	Improve administrative efficiency and the overall quality of the education received by the students.
Chen (2018)	Focused on applying several Lean principles and practices including kaizen concept in the design, development, and delivery of the course curriculum	Integrating tools and models are effective and result in more convenient calculation and application, to promote Kaizen in the service domain

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B. Lean Practices in Saudi Arabia

Lean principles and practices in Saudi Arabia not widely utilized in public and private sectors. Few studies outlined the benefits of implementing lean tools including the higher education sector. Unfortunately, there is a lack of evidence in Lean-Kaizen implementation and publication in Saudi Arabia. This revealed the need for more research to be conducted to evaluate the current status of Lean-Kaizen implementation in the Saudi Arabian higher education sector.

According to the Ministry of Education in Saudi Arabia (2018) Saudi universities are continuously improving their educational quality programs to have qualified graduate students that can contribute to the development of the country. The General Authority for Statistics (GAS) (2018) in Saudi Arabia showed that around 70% of the Saudi population is under 30 years, which means that the next generation of young Saudis is expected to have various skills and wide knowledge to achieve the country's strategic goals.

A comprehensive review of previous research related to quality practices and CI in Saudi Arabian revealed that both private and public organizations hold different types of ISO series (Al-Darrab et al., 2013, Alrubaish, 2010, Magd, 2006). Many studies focused on Lean, Six Sigma, and Lean Six Sigma (LSS) methodologies in several sectors (Abdelhadi & Shakoor, 2014, Alsmadi et al., 2012).

The review of studies on Lean Kaizen implementation in Saudi Arabian sectors showed that few studies have been published in this area over the past years. The first study in Lean-Kaizen was conducted by Abdulmouti (2015) in the manufacturing sector to improve the performance of Port Installed Options Center in Toyota Saudi Arabia. The study utilized kaizen tools including TPS, 5S, and the seven wastes. The study concluded that kaizen implementation leads to 26.9% manpower reduction, 13% increasing the annual output, improvement in the quality of production, protentional reduction in inventory, 6.4% improvement in the Associates's Engagement Index, and improvement in the production line productivity.

The second study in kaizen was performed by Alkasr (2018) in the education sector. The study investigated the possibility of applying the Kaizen strategy and its requirements at the faculty of girls' education college at Shaqra University, Saudi Arabia. The study showed that the significant importance of the kaizen strategy requirements from point of view of employees in administration departments as well as a recommendation was provided for the top management support to achieve academic excellence.

This research mainly focused on the examining the current status of Lean Kaizen implementation in the Saudi Arabian higher education sector in terms of the level of awareness, motivation factors, critical success factors (CSFs), and the benefits of Lean- Kaizen are illustrated in the following sections.

III. RESEARCH METHOD

To investigate the implementation of Lean-Kaizen within the Saudi higher education sector, an online survey was conducted to discover the extent to which the Lean-Kaizen concept, tools, and techniques have applied in the higher education sector. The survey included closed-ended questions to obtain detailed information about participated universities such as the lean tools used, CSFs, benefits, challenges, and motivation factors. Moreover, open-ended questions were included so the respondents can add further comments and answers. The survey questions attempt to provide information about the current status of Lean Kaizen implementation in the Saudi Arabian higher education sector

The current study used an online survey questionnaire to assess the current status of Lean-Kaizen implementation in the Saudi Arabian higher education sector based on 25 questions. The survey questions were derived from previous studies (Albliwi, Antony, and Arshed, 2017; Shafer and Moeller, 2012) within the field of quality control and lean manufacturing. The study data were collected from different regions in Saudi Arabia. The survey was evaluated by three academic professors to clarify the survey questions and their relation to the main research question.

A. Sampling Criteria

The following criteria was followed to ensure that the correct sample of selected universities (Voss, 2009).

- Both public and private universities located in Saudi Arabia.
- Individuals who have a good knowledge of lean concepts and methodology
- Universities that applied lean concepts, tools, and techniques.
- Universities that included information about the contacted persons such as e-mail addresses, and phone numbers.

B. Survey Distribution

The survey was sent to 29 public and private universities in Saudi Arabia using either individuals' e-mails or mobile numbers, which were available on universities websites.
An invitation letter along with the survey link was sent to 103 individuals who are working in academic and non-academic field. The respondents had a good knowledge of quality and lean concepts. At least one to three induvial from each university were invited to share information. This is to ensure receiving a wide range of responses. They were asked to fill up the online survey and answer the survey questions. The respondents' answers were analyzed and summarized.

C. Response Rate

Since this research was included the Saudi universities that apply lean principles and techniques as a methodology to improve their process, a high response rate was not expected. This is because the kaizen concept is not widely implemented in the education sector as revealed in the literature.
The total response rate of 25% is considered high (Forza, 2009). According to Collis and Hussey (2013) questioner method in scientific research could lead to obtaining 10% of the total responses. Easterby-Smith et al. (2012) stated that many researchers have agreed that a 20% response rate is an acceptable rate in academic research. The total number of distributed surveys was 103, the researcher received only 29 responses, after excluding 4 incomplete surveys from the analysis. This is resulted in obtaining a response rate of 29%. The participants provided information on the implementation of Lean-Kaizen in their universities, which was analyzed and the results are presented in the following sections.

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IV. SURVEY RESULTS AND ANALYSIS

A. General information

The first section of the survey was dedicated to gathering general information about universities including the name of the university, participant college, and position. This information is shown in table II.

Table II: General Information about universities

Description	Frequency	(%)
University		
Public	16	64
Private	9	36
College / Department		
Business School	4	13.8
College of Humanities	2	6.9
Computer and Information Technology	4	13.8
Engineering	5	17.2
Engineering and Architecture	2	6.9
Industrial Engineering	7	24.1
Science and Arts	1	3.4
Science and Huminites	1	3.4
Quality Assurance	3	10.3
Position		
Dean	2	6.9
Vice Dean	4	13.8
Departmental Head	9	31
Supervisor	7	24.1
Staff	3	10.3
Lecturer	4	13.8

Table II showed that the majority of the respondents were from public universities 19 (64%), whereas private universities respondents were 6 (36%). Regarding the college/department, most of the survey respondents belong to the Industrial Engineering department 7 (24.1%), whereas the least of the survey respondents pertain to Science & Arts, and Science & Huminites one (3.4%), one (3.4%). Concerning, the respondent's positions, a total of 9 working as Departmental Head, 7 Supervisor, 4 Vice Dean, 4 Lecturer, 3, and 2 Dean, respectively. The second section of the survey included information about Lean practices in universities.

B. Lean Training Level

The first question of the survey with regards to the proportion of employees that have trained in the lean concept. The majority of universities revealed that the percentage of employees that have trained on Lean concept (37.9%), followed by over half of its employees (27.7%), quarter to half (18.2%), and less than quarter of its employees (18.2%) Figure 1.

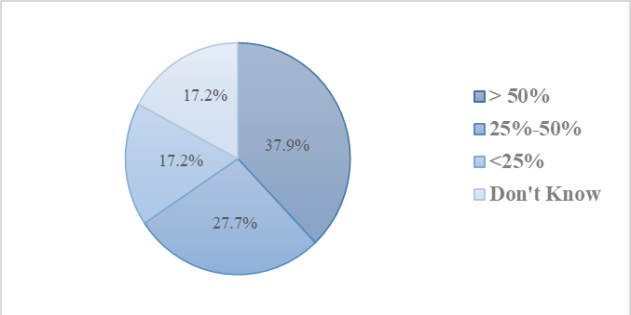

Figure 1. The proportion of employees has trained in the lean concept

Training and education among one of the important CSFs when conducting a Lean program (hu et al., 2015). Although, many Saudi universities provide development courses for academics and staff, very few lean training courses are organized. Thus, more attention to lean training courses should be arranged, including lean tools, waste elimination, and continuous improvement methods in the higher education environments.

These results showed that Lean training is not a priority for Saudi universities despite the fact that previous studies on LHE recommend that all employees should be aware of Lean concepts and practices (Balzer, 2010). Generally, it can be stated that Saudi Arabian universities not much-trained employees on Lean in both public and private universities.

C. Uses of Lean Practices

The respondents were asked for how long the university deployed the lean concept. The results indicated that 16 (55.2%) of these universities deployed the lean concept for 1-5 years, 5 (17.2%) for 6-10 years, and 8 (27.6%) more than 10 years (Figure 2). This finding could lead to the conclusion that the lean concept somewhat recognized by many universities in Saudi Arabian education sector, mostly those in the public sector. Furthermore, this indicates that the universities could achieve a better level of implementation of lean techniques and encourage its employees through the use of quality tools (Alsaleh, 2007). The literature revealed that the implementation of lean has faced many obstacles in Saudi Arabia such as the lack of a well-defined process, the lack of effective communication, the diversity of the customers (Al-Shafei et al., 2015).

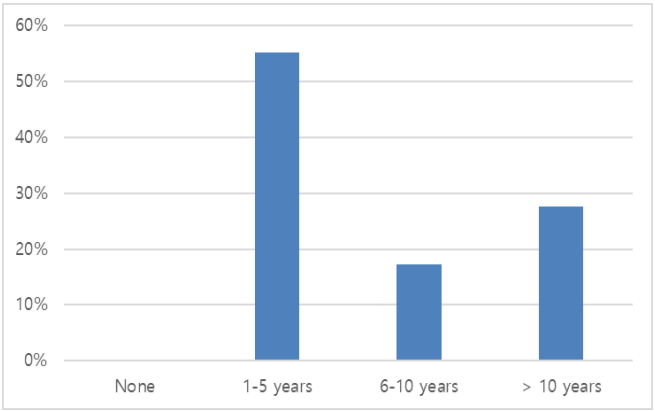

Figure 2. Duration of implementing Lean

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D. Level of awareness about the lean concept

In this study, the awareness level of the lean concept in the Saudi Arabian higher education sector was evaluated. It includes both induvial and university awareness. Indeed, the level of awareness of the lean concept is different in term of the level of implementation. For example, a participant with full awareness about the lean concept, means that they have good knowledge and experience in the lean practices. However, it does not reflect the level of lean concept implementation within the university. The respondents reported that they were fully aware of the lean concept, 14 (48.3%) were well aware, 13 (44.8%) were somewhat aware and 2 (6.9%) had limited awareness. This indicates that the respondents had a good knowledge of the lean concept and reflects their understanding of the survey questionnaire.
According to the respondents' perspective, most universities (51.7%) have sufficient knowledge about lean as a continuous improvement process. Additionally, (34.5%) somehow agreed that the universities had awareness in comparison to the (13.8%) stated that their universities were not aware of the lean concept.

E. Lean Projects Completed Successfully

The participants were asked to rate the extent to which Lean projects have completed successfully. The lean projects were considered to align with university main goals and strategic objectives. The results, as shown in Figure 8 indicate that 20.7% (13.8% public and 6.9% private), of the universities with 1-5 projects had completed lean projects successfully compared to 48.3% of the universities with 6-10 projects (31.1% private and 17.2% public). Moreover, there were 31 % of the universities (24.1% private and 6.9% public) had completed lean projects successfully.

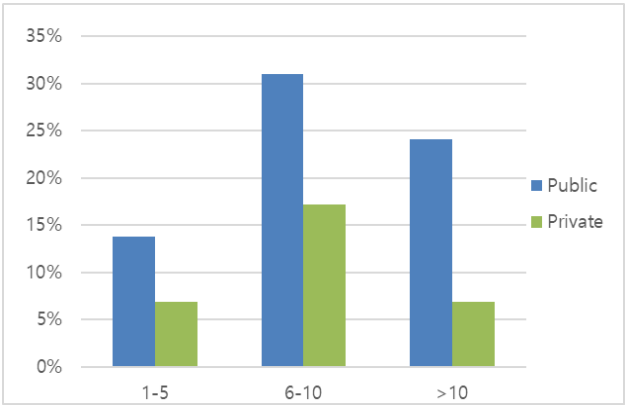

Figure 3. Percentage of completed Lean projects/year

It was observed that some of the respondents had little knowledge of the number of completed lean projects in their universities. This is because of a lack of recording data about the previous lean projects. Another reason is lack of communication between employees in the universities.

F. Continuous Improvement Methodologies

It was found that some universities had entailed the adoption of lean concept as a continuous improvement methodology. Furthermore, few universities had integrated lean with six sigma methodologies and use the Lean-Kaizen. The results of the study indicated that most universities have used TQM as the foundation for their continuous improvement program. This revealed that TQM is commonly utilized by many Saudi Arabian universities, including public and private universities. However, the literature showed that the implementation of TQM has several obstacles in Saudi Arabia, which includes an improper definition of the process, not effective utilization of communication, and the variety of the customers' requirements (Al-Shafei et al., 2015).

Table III: Continuous improvement methodologies have been used

Continuous improvement methodology	Percentage	University
Lean	27.6%	Private / Public
Six Sigma	34.5%	Private / Public
Kaizen	10.3%	Public
TQM	79.3%	Private / Public
Others	6.9%	Private

G. The Quality System Practices

International Organization for Standardization (ISO) is the most popular quality-related practices in Saudi Arabian organizations and well recognized by both public and private organizations. This is because of the simplicity of its requirements and low cost (Antony et al., 2005). Organizations that have received ISO can implement the basic methods of the quality management system, which results in creating a foundation of quality concepts.
From the participated universities in the sample, 82.8% used ISO as a foundation for total quality management (TQM), Six Sigma, and Lean implementation. This indicates that Saudi universities are ready to utilize any quality tools and obtain the benefits of the integration of ISO standards with Lean or Six Sigma methodologies.

Table IV: The Quality System

Quality system	Percentage	Public / Private
ISO 9001	82.8%	Public / Private
ISO 45001	0	-
ISO 13053 (Six Sigma)	0	-
ISO 21001	18.2%	Private / Public
Others	17.3%	Private
None	10 %	Public / Private

H. Major Types of Waste in the Context of Higher Education

The respondents were asked about major types of waste in higher education. The results in table 4.5 showed the top five ranked major waste in Saudi Arabia higher education sector.

Table V: Major Types of Waste

Rank	Type of waste
1	Limited materials needed for teaching and testing including quality, time, and cost
2	Uncoordinated teaching, coaching, and testing
3	Graduate students, who could not get a job
4	Courses contents that do not contribute to the student value concepts
5	Bad planning in teaching, and testing evaluation

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The most major type of waste was limited materials and facilities needed for teaching and testing including quality, time, and cost Figure 3. This may be because of several factors including a shortage of materials and facilities for teaching, not completing the required activities on time, not keeping an update of study plans continuously, and inappropriate design of courses and education programs, which leads to dissatisfy students' needs, and not achieve university objectives as reported in previous studies (Jorn Dahlgaard, 2000; Lareau, 2003).

This means Saudi Arabian universities should focus on the ways of providing more useful materials and enough facilities for students, organize and developing new teaching methods, review the education outcomes, develop study plans continuously and improve student's evaluation methods.

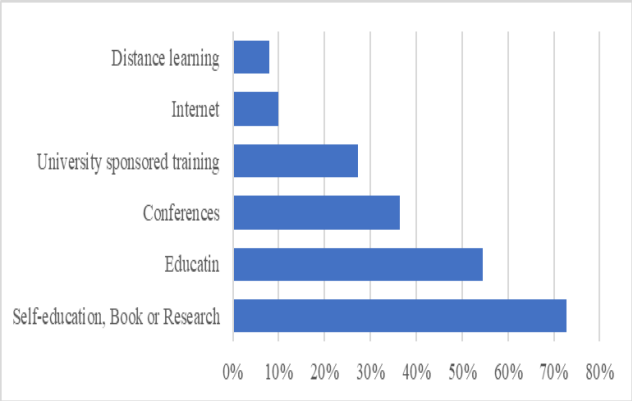

Figure 4. Methods of learning about quality improvement

I. Benefits gained from implementing Lean-Kaizen

The benefits gained through the implementation of Lean-Kaizen in the Saudi Arabian higher education sector, as reported by the participants, are ranked as following increased student satisfaction, improve process quality, reduced cycle time, reduce waste in the process, reduced cost of quality, and increased profits and financial savings. It was noted that Saudi Arabian universities focus more on student satisfaction, improve process quality, and reduction of cycle time and waste than on financial benefits and saving. This trend was previously reported in the study conducted by Alsmadi et al. (2012). Indeed, the evolution of technology and advanced education learning has changed the focus of Saudi Arabian universities on satisfying students' needs.

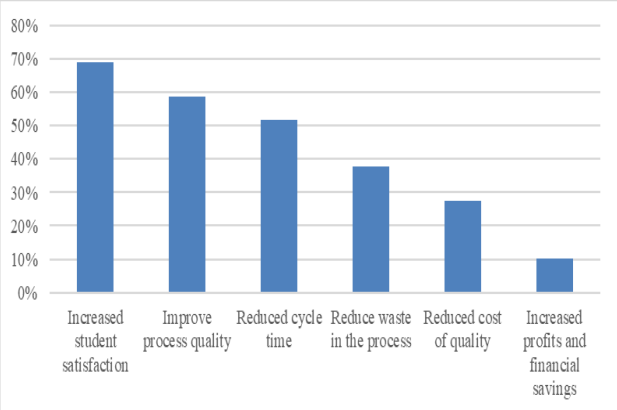

Figure 5. Benefits of Lean-Kaizen

J. The Methodology/Tools/Techniques Used In Lean-Kaizen Projects

There are limited studies in literature that suggest the uses of Lean-Kaizen tools in the higher education sector, particularly in the teaching and learning processes. The results of the survey show that limited tools of lean were used in Saudi Universities. These findings are aligned with the previous study conducted by Albliwi et al. (2015) and Alsmadi et al. (2012). The most common lean tools used were simple tools such as root cause analysis, brainstorming, and statistical tools and techniques. Other Lean-Kaizen tools such as 5S, visual management, process mapping, and value stream mapping were not utilized by Saudi universities although these tools have significant importance in the education process. Saudi universities should spread out the usefulness of Kaizen-Lean tools and implement them in the Lean projects.

V. DISCUSSION

Lean-Kaizen is a new concept in the Saudi Arabian higher education sector, which aims to improve the education process and eliminate all aspects of waste. The results of this study showed that there are many aspects of Lean-Kaizen implementation in Saudi Arabian universities should be examined. Moreover, there was limited awareness about the levels of implementation and success of Lean-Kaizen initiatives. Waste elimination is the main benefit of adopting Lean-Kaizen. Most respondents have agreed that adopting Lean-Kaizen in higher education sector leads to improve process quality, reduced cycle time, and reduce waste in the process. These findings are in accordance with studies conducted by Balzer et al. (2016) and Womack and Jones (2003). To present the current status of Lean-Kaizen in Saudi Arabian universities, the results have been classified based on the nature of the participated universities, which are public and private universities.

A. Public Universities

In this study, 67% of the participants were working in public universities. It seems that public universities rate well in the success factors relating to the current status of Lean-Kaizen initiatives as they have established an advanced level of training to their employees as well as the availability of educated people with high levels of Lean and Lean Six Sigma awareness. However, the main challenge of deploying Lean-Kaizen in Saudi Arabia is changing organizational culture and people's behavior toward CI practices. In addition, ut was observed that many public universities had started to adopt the lean concept. Theses university counts with several members of staff who have received lean and Six Sigma certificates and have organized several lean training courses and sessions.

B. Private Universities

The participants from private universities were limited and not anticipated effectively in this study. Some universities struggled more with Lean-Kaizen implementation than the public universities. The main challenges faced by private universities related to training, leadership, communication, and lack of top management support and commitment.

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Consequently, the private universities that seek for quality excellence can be better prepared for Lean-Kaizen implementation because of their flexibility of roles and procedures. The results of the survey revealed major differences between public and private universities in terms of Lean -Kaizen adoption and CI improvement initiatives. In contrast, they have pointed out similar challenges in terms of levels of awareness of Lean-Kaizen, resistance to change, and lack of communication and leadership. The following recommendations have been outlined by the author to the aspiring universities to the successful implementation of Lean-Kaizen:

- More efforts should be made by the top management of the universities to adopt Lean-Kaizen practices, uses of lean tools, and create a quality culture throughout the entire university.
- Motivation and commitment of the employees (academic and non-academic) with the needed skills are necessary to create lean awareness. This can be achieved by establishing a training program related to Lean- Kaizen to all employees.
- Universities must focus on waste elimination and identifying no-added value activities in the education environment as they influence several factors such as strategic plans, education process, employees' attitude, and students. Therefore, universities should create effective continuous improvement practices.

IV. CONCLUSION

Lean-Kaizen plays a major role in minimizing waste and non-value-added activities. In such a highly competitive global education environment, it should be utilized as a target for continuous improvement. The purpose of this study was to examine the current status of Lean-Kaizen implementation in the Saudi Arabian higher education sector. Results showed that the implementation of Lean-Kaizen is still in the early stages and not adopted effectively by both public and private universities. This study could help researchers and practitioners in the application of Lean-Kaizen in the Saudi Arabian higher education sector. The information gathered to provide insights on analyzing factors for the successful implementation of Lean-Kaizen. The study was focused mainly on Saudi Arabian universities; therefore, another study could be conducted in other developing countries to know the level of Lean-Kaizen implementation. Further research could be conducted to develop a framework for using Lean-Kaizen in different aspects of the education process. This can assist and support the universities in measuring their Lean-Kaizen deployment levels. Generally, it could be concluded that the current status of Lean-Kaizen implementation in the Saudi Arabian higher education sector is behind than expected when compared to international and leading universities. However, the awareness about lean concepts, tools, and techniques including Lean-Kaizen is increasing in the country and hopefully, the universities would achieve a good level of successful implementation.

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