Research Title

Study of Lean System Higher Education Institutions Practices and Lean System Outcome

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By

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Statement of Original Authorship

I declare that the contents of thesis are my own work, and ensure this work is original. The work quoted from other published books, articles, or internet sources is acknowledged with citations. I also certify that contents contained in this report have not been published or presented before for any degree in any university.

Mariam Altaf Tarar

Acknowledgement

"And whoever is careful of (his duties to) Allah, He will make for him an outlet,

And give him sustenance from whence he thinks not; and whoever trusts in Allah, He is sufficient for him; surely Allah attains His purpose; Allah indeed has appointed a measure for everything"

(Surae Al-Talaq Verse No 2 and 3).

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Publications

1) Mariam Altaf Tarar and Chin, C.M.M. (2017), “Need for a Lean and Green manufacturing integrated approach“, 4th Postgraduate Colloquium for Environmental Research 2017, by The Centre of Excellence for Green Technologies (CEGT) of the University of Nottingham Malaysia Campus (UNMC).
2) Chin, C.M.M., Singh, A.S.G.I., Sakundarini, N. and Tarar, M.A. (2017), “Sustainability of Green Building Construction in Malaysia“, in 4th Postgraduate Colloquium for Environmental Research 2017, by The Centre of Excellence for Green Technologies (CEGT) of the University of Nottingham Malaysia Campus (UNMC).
3) Sakundarini, N., Chian, H.C., Chin, C.M.M., Tarar, M.A. (2017), “Empirical approach for analysis of energy consumption on machining process: turning and milling machine “, in 4th Postgraduate Colloquium for Environmental Research 2017 by The Centre of Excellence for Green Technologies (CEGT) of the University of Nottingham Malaysia Campus (UNMC). [Journal publication in process]
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5) Aisha Mahmood, Zulhasni Abdul Rahim, Muhammad Mansoor and Mariam Altaf Tarar “Redesigning the way future engineers learn to solve inventive problems” in The TRIZ Journal (online), June Issue, 2016 [https://triz-journal.com/].
6) Conference publication ‘Redesigning the Way Future Engineers Learn to Solve Inventive Problems’, published in Proceedings of the TRIZfest-2015 International Conference. September 10-12, 2015, Seoul, South Korea.
7) Tarar M.A., Chin C.M.M and K.Y Tshai (2018), “Lean in Parallel with Green Manufacturing,” in 4th International Conference of Chemical Engineering and Industrial Biotechnology, 1st -2nd Aug 2018, Kuala Lumpur, Malaysia.
8) Tarar M.A., Chin C.M.M and K.Y Tshai (2018), “Lean system in worldwide Higher Education Institutes (HEIs)”, UNMC LINK ’18 PG Conference, University of Nottingham **Malaysia** Campus.

Trainings and Achievements

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5. Participated online training “Application of Operation Research techniques for Industrial Engineers” on 29/11/2014, conducted by Pakistan Institute of Industrial Engineers.
6. Three Minute Thesis Competition 2016, University of Nottingham.
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- Using posters to communicate research: 12/1/2015
- Creating a poster in PowerPoint: 14/1/2015
- Nature of the PhD and the supervision process: 9/2/2015
- How to be an effective researcher: 11/2/2015
- Preparing for your annual review: 1/6/2015
- Word essential for researchers: 3/6/2015
- Assessing and giving feedback: 17/10/2016
- Demonstrating in laboratory practical: 18/10/2016
- Preparing a press release: 15/5/2017
- Preparing for your VIVA: 5/6/2017
- Introduction to the skills of teamwork: 9/6/2017
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Abstract

Lean system application is successfully recognised in manufacturing sector. However, its implementation in HEIs is at nascent stage. This research investigates Leans system particularly in HEIs context for imbibing quality excellence. The research aims to empirically investigate the Lean System Higher Education Institution (LSHEIs) practices and Lean System Outcome (LSO). For this purpose, the LSHEIs practices in teaching processes and LSO are identified. This research provides insights into the Lean system in the HEIs through qualitative method. On basis of literature review, the theory is developed for LSHEIs Practices and LSO. The qualitative study is conducted through semi-structured interviews to identify practices of LSHEIs and potential LSOThe LSHEIs practices categorised under four Lean Principle Levels i.e. Philosophy, Process, People and Partners and Continuous Improvement. Qualitative results identified 94 codes for LSHEIs practices and LSO. The qualitative result provides the evidence of the relationship of the LSHEIs practices and LSO, and supports the literature. The qualitative results helped to conceptualise study on the developing countries and filling gap of limited researches on Lean system in HEIs. It will help higher education institutions to improve and other researchers and practitioners to expand knowledge in this area.

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List of Acronyms and Abbreviations

CI	Continuous Improvement
DFM	Design For Manufacturability
ERP	Enterprise Resource Planning
HE	higher education

HEIs	higher education Institutions
HRM	Human Resource Management
IMVP	International Motor Vehicle Programme
ISO	International Standard Organisation
JIT	Just in Time
KAUST	King Abdullah University of Science and Technology
KPI's	Key Performance Indicators
LM	Lean Manufacturing
LAI	Lean Advancement Initiative
LEI	Lean Enterprise Institute
LSS	Lean Six Sigma
MIT	Massachusetts Institute of Technology
MOHE	Ministry of Higher Education
MOE	Ministry of Education
MRP	Material Requirement Planning
NHS	National Health Service
NVA	Non Value Adding
QFD	Quality Function Deployment
RIE	Rapid Improvement Enterprises
RIW	Rapid Improvement Workshops
SMEs	small and medium sized manufacturing enterprises
SOP	Standard Operating Procedures

SPC	Statistical Process Control
TMC	Toyota Motors Co.
TOC	Theory of Constraints
TQM	Total Quality Management
Triz	The Theory of Inventive Problem Solving
UKM	Kebangsaan Universiti Malaysia
UPM	Universiti Putra Malaysia
UniKl	Universiti Kuala Lumpur
UNMC	University of Nottingham Malaysia campus
VSM	Value Stream Mapping

CHAPTER 1

Chapter 1 Introduction

This chapter discusses the background and perspective of this research, followed by an underlining of the research problem, research questions and objectives. It explores the higher education institutions in Malaysia. The following sections show the significance, scope, and operational definitions of key terms used in this research. Lastly, discusses the thesis outline.

1

Research Background

1.1

The philosophy of "lean manufacturing" or "lean production" was introduced as the "Toyota production system" or "just in time" manufacturing, and Toyota was the first to introduce it. Later on, the book entitled, '*The Machine that Changed the World',* contributed by Womack et al. (1990) used the term "lean manufacturing" or "lean production." The book was based on the benefits gained from the transformation of mass production in Toyota. In another book, '*Lean Thinking'* (Womack & Jones, 1996), the research on Lean manufacturing continued and Lean was established as a system approach instead of just being applied as a technique. In manufacturing industries, the Lean system drastically transformed not only the production and quality sections, but its impact was also observed in the whole system of industry from demand to the delivery of the product (Emiliani, 2006).

Lean is defined as "manufacturing without waste" (Womack et al., 1990). Waste are the resources, which are utilised other than the minimum required resources needed to manufacture the product. In other words, waste are the resources, which are utilised other than the essential required resources for the performance of that job; such as man, material, machine, method and time. "Lean" simply means reducing waste, which is also known as *muda* in Japanese. *Muda* includes all defective products and defective reworks and has seven categories: overproduction waste, inventory waste, transportation waste, waste from product defects, processing waste, waste of motion, and waiting time waste (Emiliani, 1998). The Lean system focuses on waste that does not add value to the product or service, and the objective is to reduce and eliminate waste in manufacturing or service (Womack & Jones, 1996). According to Ghosh (2012), the waste elimination seems to be simple whereas its identification is critical in any industry.

Due to the pressures of gaining competitive advantage and sustainability in the global market, many traditional manufacturing industries in the USA and Europe changed to the Lean system in the 1990s (Taj, 2008). The key to the sustainability of any industry lies in its quality achievement and customer satisfaction (Yusof, 2008). Thus, the Lean system plays a vital role in quality improvement and compliments Total Quality Management (TQM). Nowadays there are many quality, management and innovation concepts like TQM, the European Quality

Award, the International Standard Organisation (ISO), the Malcolm Baldrige Quality Award, Quality Assurance, Six Sigma, etc. These concepts also focus on the issues of manufacturing industries as well as service sector quality and customer satisfaction either explicitly or implicitly, in order to take competitive advantage (Yusof, 2008).

The Lean system was found to be successful in manufacturing industries, and essential for the sustainability of the industrial sector. Western industries adopted the Lean system and established many success stories of its implementation like Toyota, Motorola, Dell as well as in Small and Medium sized Enterprises (SMEs) (Albliwi et al.,2014). These days Lean system adoption is moving its application towards the service sector e.g. the health and education sectors (Comm & Mathaisel, 2005b). Globally, the service sector contributed in top economies around 50% of the gross domestic product (Gupta et al., 2016). The service sector is unique from the manufacturing sector because of its distinctive characteristics of intangibility, inseparability, heterogeneity, simultaneity, perishability, labour intensiveness and customer presence at the time of service delivery (Hadid et al., 2016; Sampson & Froehle, 2006; Lovelock & Gummesson, 2004; Sadiq et al., 2003; Bowen & Youngdahl, 1998). According to Gupta et al. (2016), Lean research is especially nascent in the service sector compared to the manufacturing sector because it is important to understand the Lean system from a service perspective. In order to apply Lean principles successfully in service sector, it is essential to distinguish the difference in the processes of both sectors (Hadid et al., 2016; Hadid & Mansouri, 2014; Malmbrandt & Ahlstrom, 2013). The studies (Laureni et al., 2010; George, 2003), as cited in Sunder (2016b), revealed reasons of service sector to implement Lean system and found that service processes could be slow, which impact cost and led to errors and ultimately effect customer satisfaction. The processes in service sector are also complex and involve work in processes, which led to waiting time increase and cost non value adding.

In the service sector, Lean system applications are also found in insurance, banks, call centres, financial services, hospitality firms, Courtyard brands, Marriott Hotels with their Fairfield and discount airlines like Southwest Airlines (Sunder, 2016b; Comm & Mathaisel, 2005b). According to Suarez et al. (2012), the Lean system in the service sector brought drastic change to the economy by maximizing the utilisation of available resources and “value” concept. Gupta et al. (2016) found that cost reduction is the main motivation for adopting the Lean system whereas eco efficiency and the demand for change are other factors.

In the health sector, hospitals are the most common service sector where Lean system implementations are reported to be frequent. It is found helpful to improve different processes and systems through evaluating gaps in current state and Lean implementation (Douglas et al., 2015; Kimsey, 2010).

The literature on service quality and the higher education sector continuous improvement has been relatively neglected (Khairi & Rahman, 2018; Sunder, 2016a). Malmbrandt and Ahlstrom (2013) have stressed the finding of further evidence of the importance of Lean system in service and conducting more empirical investigations of the Lean system in the service sector.

Research in Malaysia revealed that the Lean system implementation is common and is promoted mainly in manufacturing and industries (Khairi & Rahman, 2018). Kang and Manyonge (2014) argued that Higher Education Institutions (HEIs) are facing similar challenges like in manufacturing sector, i.e. increase competition, higher quality at lower cost and variability in customer demands. According to Khairi and Rahman (2018), the universal benefits of Lean system are comparatively less reported in the service sector and HEIs; they found that a lack of awareness is one of the basic reasons for the hindrance of its implementation in HEIs. Most of the research on Lean system is found in some customised areas like in curriculum design (Dey, 2007), course design (Emiliani, 2005, 2004), student assessment (El-Sayed et al., 2011) or in other individual processes (Douglas et al., 2015). The case studies of HEIs with Lean implementation were found mostly in the USA and European HEIs and very little in other regions like Africa and Asia. The approach adopted commonly by HEIs is the consultation and facilitators supports to improve administrative procedures and process in HEIs (Salewski & Klein, 2013; Cristina & Felicia, 2012; Radnor & Bucci, 2011).

Nowadays, the worldwide HEIs address quality issues and it became the main concern, as education became one of big industry or business. The reason is that the education sector plays an important role in the country's economy and the education economy has been increasing for years. The education sector is emerging as a 'commodity' which is spurning big and small businesses (Abdullah, 2013; Yusof, 2008). There is an intense competition among worldwide national and international HEIs (Brauweiler & Zhakshylykov, 2020; Comm & Mathaisel, 2005a). The challenges faced by HEIs raised need of improved quality, responsiveness, accountability and innovation (Yusof, 2008). Worldwide higher education has become one of the most important pillars of human development (World Bank, 2002). According to Comm and Mathaisel (2003), the primary factors that caused changes in HEIs are HEI's delivering expectations and quality concern higher in public and parents, HEIs rating concern is increased, student population has demographic changes and lastly cost is increased.

HEIs posseses service industry characteristics, including perishable, intangible, inseparable, heterogeneous, variable and student participate in the process as a customer. HEIs competitive environment is conducive to adopt service quality concept (Yusof, 2008). Roffe

(1998) argued that the industries have small number of performance indicators whereas HEIs require more such performance indicators identification. Sunder (2016a) stated that intangible characteristic of service sectors made HEIs different from manufacturing sector with respect to output measurement. However, it is possible through adopting techniques of industries to measure the quality of services and customer satisfaction. The expectations to provide high quality services comparative to the market are increasing for the education sector. Many universities across the US have improved processes and saved costs, including the University of Wisconsin, the University of Iowa, the University of New Orleans etc. through cost reduction, and process improvements (Malanda, 2015).

Furthermore, many UK HEIs have implemented continuous improvement programs and have brought changes in processes and culture (Malanda, 2015). Literature documented that number of HEIs adopted process improvement emerging techniques such as TQM (Bayraktar et al., 2008; Sahney et al., 2003; Mizikaci, 2003; Mergen et al., 2000), Lean system (Maguad, 2007; Comm & Mathaisel, 2005a, b), six sigma (Sunder, 2014), Lean six sigma (Sunder, 2016b; Antony, 2014; Antony et al., 2012; Furterer, 2009). Worldwide, HEIs have initiated restructuring practices as a result of globalisation including Malaysia (Ibrahim et al., 2011). The HEIs are focusing on improving the quality of education and services. According to Lee (2004, pp. 36) as cited in Ibrahim et al. (2011), "… instead of producing and transmitting knowledge as a social good, the universities are placing emphasis on the production of knowledge as a marketable good and saleable commodity. Universities are engaged with market- related activities."

1.2 Higher Education in Malaysia

The development of higher education in the Asia region is impressive in last decade. The governments are focused on the policies to improve education system and make it accessible to all people in various countries (Lee et al., 2017). They are facing pressures of expansion of education, increase in cost and decline of funding; these pressures led them to restructure HEIs and being an academic and institutional excellence. The restructuring in terms of corporatisation of public HEIs, privatisation of HEIs, regulations of quality of HEIs (Lee et al., 2017), generation their own income (Ahmad & Farley, 2014) marketisation, internationalisation and massification (Harvey & Williams, 2010). A noticeable competition is observed among HEIs and they adopted quality service as a tool to gain advantage over other competitors (Sadiq et al., 2003). Many accreditation bodies and National Quality assurance are established in countries to evaluate quality and performance of HEIs (Lee et al., 2017).

Malaysia was under British colonial rule before independence and after independence in 1957 its HEIs inherited British higher education model (Wan & Sirat, 2018; Lee et al., 2017). Schiller

and Liefner (2006) posited that the developing countries are required to develop their own models. Strehl et al. (2007) diverges attention towards the importance of all stakeholders of HEIs support to adopt new system succesfully. According to Ahmad and Farley (2014), HEIs in Malaysia need to develop their strategic plans, long and short term plans to incorporate performance improvements. Ministry of Education (MOE) vision is to make Malaysia a centre of quality excellence and hub of education in Asia (Luo, 2017; Rahman & Firdaus, 2016; Grapragasem et al., 2014). In 2007, the Malaysian government established the National Higher Education Strategic Plan 2020 and policies defined governance, internalisation, marketability, delivery systems, employability, research and development, performance, and quality of HEIs in Malaysia (Ahmad & Farley, 2014). The strategic plan was based on four phases; laying foundation during 2007-2010, strengthening and enhancement during 2011-2015, excellence during 2016-2020 and lastly sustainability beyond 2020 (Grapragasem et al., 2014). Muzamil and Idris (2012) defined five dimensions of service competitive priorities in Malaysia including low cost, quality, flexibility, delivery and innovativeness.

University of Malaya (UM) founded in 1959 after independence (Lee et al., 2017) focused to produce skilled human resource, and other four public universities founded between the late 1960s and early 1970s. These four public universities including Universiti Sains Malaysia (USM), Universiti Teknologi Malaysia (UTM), Universiti Putra Malaysia (UPM) and Universiti Kebangsaan Malaysia (UKM) introduced various disciplines and specialised in defined key areas. Likewise USM increase graduates in the sciences, UTM and UPM upgraded from technical and agriculture colleges and increased graduates in technological, agriculture and engineering fields, and UKM has mandated the Malay language as medium of instruction (Wan & Sirat, 2018). The private institutions were established under the Private Higher Education Institutions Act 1996 (Act 555), and private institutions were first one to allow English language as medium of instruction (Wan & Sirat, 2018). Education further diversified by various colleges and HEIs offering twinning and franchised degree programs through partnerships with other institutions from the US, UK, Canada, Australia, Germany, France, and New Zealand (Grapragasem et al., 2014; MOHE, 2009). In Malaysia, the Ministry of Higher Education (MoHE) was established in 2004 and it did just not just focus on locals being enrolled but also opened up opportunities for foreigner students (Grapragasem et al., 2014; Ibrahim et al., 2011) as shown in Table 1-1. According to Ministry of Higher Education Malaysia, the HEIs is classified as public and private Universities. The government universities are considered under public universities and private universities also includes foreign international universities campuses. In 1985, there were only six public HEIs in Malaysia, and now there are 20 public HEIs with at least each located in each state of Malaysia (MOHE, 2017; Haji, 2017; Tierney & Sirat, 2008). The private universities also established the inclusion

of international foreign campus e.g. eighty private universities and nine foreign campuses in Malaysia (MOHE, 2017; Haji, 2017), see Appendix A. The public and private HEIs spurred the economy by attracting more foreigners coming for higher education and locals to get international campuses at doorstep. The Malaysia stood 11th in the world ranking among destination countries for international students and increase in public and private HEIs is also positive sign of progress (Grapragasem et al., 2014; MOHE, 2009).

Table 1-1 Number of Students' Enrolment in HEIs (2016)

S.no	HEIs Sectors	*Non-Malaysian Students*	*Malaysian Students*	Total Students
1.	**Public Universities**	25,824	506,225	**532,049**
2.	**Private Universities**	40,760	354,673	**395433**
3.	**Private-Foreign Campuses**	4,567	69,960	**74527**
4.	**Total**	**71151**	**930858**	**1002009**

Source: Author (Information from MOHE, 2017)

In 2018, the Malaysian government allocated an increase of 13.15% to the budget for the MOHE to develop Higher Education for the country (Bernama, 2017). The government is committed to improve the quality of HEIs and the budget has increased in recent years (Haji, 2017). The Malaysian government intended to turn Malaysia into an education hub for Asian and other countries (Norliza et al., 2017; Ibrahim et al., 2011). First, to reduce the expenses of foreign exchange incurred in sending students overseas (Yusof, 2008). Second, to increase the numbers of foreign students, who prefering Malaysia to pursue their higher education. In other words, internationalisation in which the international students' cost of education in any public HEIs are very little compared to if they choose any university in the US, UK and Australia (Haji, 2017; Grapragasem et al., 2014; Yusof, 2008). Thirdly, to develop the faculties, offer advanced programs and enhance the research and development capabilities at HEIs (Haji, 2017).

In Malaysia, the HEIs have a vast potential to develop and grow in order to generate more foreign exchange and continuous improvement (Yusof, 2008). This is possible with the acquisition of new management technique and the offering of high quality services in both academic and administrative process. According to Norliza et al. (2017), the Malaysian government is making improvement measures in order to enrich the quality of the institutions' systems and graduates. The government is making initiatives in industrial training, graduate internship programs, liaison with industry in curriculum design, and enhancing the student learning environment and experiences.

The statistics regarding the enrolment of international students at public and private HEIs from 2001-2017 showed the positive results of the government's initial initiatives and improvement measures (Luo, 2017), as shown in Figure 1-1. In addition to other factors (geographic location, literacy rate, etc), the government's improvement initiatives strategically helped to gain competitive advange among other countries in region. According to Luo (2017), the Malaysian HEIs are the hub and top draw card for many Muslim international students and most of the percentage of international students is from Muslim countries i.e. Pakistan, Bangladesh, Nigeria etc.

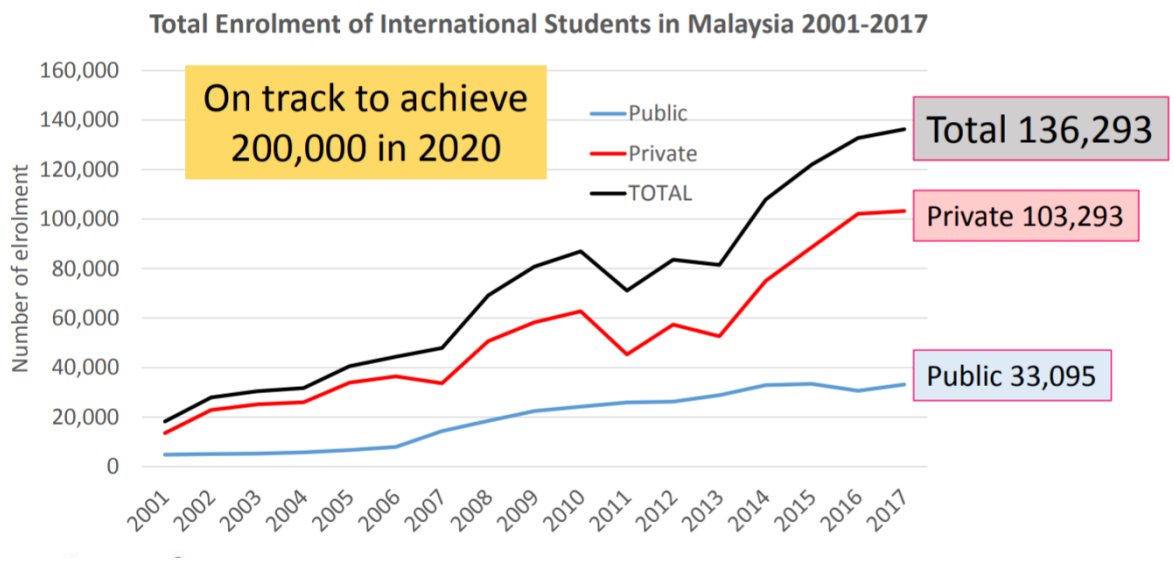

Figure 1-1 Enrollment Trend of International Students in Malaysian HEIs (2001-2017)
Source: MyMohes, Unit Data, BPPPD, KPT (2017)

Higher education improvement is now a global concern all over the world. This concern drastically boosts the competition, innovation and management of institutions and their programs' effectiveness as well as efficiency (Al-Khatib, 2000). Many public and private sector HEIs were developed and improved in the 21st century for instance in Malaysia (MOHE, 2017; Haji, 2017). The industry sector success of quality management system provoked the question of assessing the use of these systems in HEIs. Their use does not mean that they will double the profit of such institutions, but they will improve the performance and quality of institute services and help to deliver what the industry and society demands (Alawnah, 2004).

Initially, HEIs committed to adopt quality excellence and reformed mainly non-academic services like admission, funds utilisation, administration and others (Sadiq et al., 2003).

Yorkstone (2019, pp. 12) also stated that the most success stories are common in secondary process of HEIs e.g. students administration (registry), library, facilities, student wellbeing, IT, human resource and finance. The Ministry of Education (MoE) in 1996 introduced a customer charter in which formalised the policies to adopt TQM principles at all levels and departments of HEIs. A grading system is considered as measure the performance of each department and its faculties and national accreditation committee established in 1997 (Sadiq et al., 2003). According to Hamdan et al. (2011), the enhancement of quality and teaching and learning excellence are two of the seven outlines defined by National Higher Education Strategic Plan. The quality of services is important to gain competitive advantage and sustainability to ensure attraction for new and retaining existing customers (Ali et al., 2016; Ugboma et al., 2007; Sadiq et al., 2003). According to Njie et al. (2012), the service quality gauged by students on basis of their experience of each service in HEIs and students play pivotal role in measuring level of satisfaction on services. The perception and satisfaction of student on the learning and teaching is considered as measure of quality of HEIs (Naidu & Derani, 2016). According to Hanasya et al., (2011) the factors led to students satisfaction are students' perception on learning and teaching and supporting facilities including infrastructure, lecture halls, laboratories, libraries, IT and computer resources, learning environment, social spaces and others. Hamdan et al. (2011) posited increasing the importance of facilities management process including infrastructure and resources contribution in quality, growth of HEIs and stakeholders satisfaction. Kahl (2014) studied that the perfect learning environment can be enhanced by digitising campus, more resources in libraries, industrial and practical knowledge, faculty member industrial exposure and increasing engaging more outside the classrooms. According to Rahman and Firdaus (2016), the management and employees relationship important to bring culture excellence, in which employees motivated and empowered to perform with dedication. Tang (2018) highlighted the acquisition of soft skills in faculty member to facilitate its learning is equally significant in teaching process, these soft skills including mainly communication, problem solving, critical thinking, leadership, team working and other interpersonal skills. Aziz and Abdullah (2012) stressed to obtain accreditation from international bodies in addition to Malaysian bodies, overseas internships and research opportunities for sustainability. Hanapi and Nordin (2014) depicted that unemployment rate is increasing Malaysia like in other worldwide countries, and posited to restructuring for controlling the situation. The factors identified as cause of unemployment of graduates are quality of students (Rahmah et al., 2011), lack of technical, problem solving and soft skills (Hanapi & Nordin, 2014), quality of education, weak industry liaison, a rapid increase of graduates, economic recession (Nasrudin, 2004), faculty member competency (Hanapi & Nordin, 2014).

In Malaysia region, the Lean system research in HEIs mainly found out about awareness level and the implementation potential of the Lean system in local HEIs (Khairi & Rahman, 2018). Ahmad et al. (2016) researched on the Lean management approach through its principles at the academic libraries and proposed the technique that can be used to achieve student (customer) satisfaction. Aishah (2016) studied the Lean principle of Kaizen (Continuous improvement) application and its effect on student's satisfaction and compared two HEIs data in Malaysian HEIs. The research about the Lean system in Malaysia HEIs is at pre inception stage and found very scare contributions on its adoption and evaluation (Khairi & Rahman, 2018; Aishah, 2016; Ahmad et al., 2016). Literatures review (Douglas et al., 2015; El-Sayed et al., 2011; Dey, 2007) showed that authors stressed on different areas of improvement to sustain and maintain quality of education whereas gaps found in comprehensive approach to combine these different areas of improvement under an umbrella. The Lean system is an approach which can meet five identified dimensions of service sector of Malaysia (Muzamil & Idris, 2012), like it is found successful in other European and US HEIs.

1.3 Problem Statement

Emiliani (2005) highlighted the challenges of higher education and predicted fierce competition among national and international HEIs on the basis of the pricing and profits which results from their practices. The President of the National Centre for Public Policy and Higher Education (America), Patrick Callan states, "College costs are rising faster than any other major sector of the economy except health care" (Symonds, 2003), as cited in Comm & Mathaisel, 2005b). Usually the HEIs manage such pressure by increasing tuition cost and downsizing of teaching and non-teaching staff. This strategy seems management failure and ineffective solution of such pressures in competitive environment. Emiliani (2016) accedes that HEIs are under intense pressure due to cuts in government funding, increased operating costs and reducing enrolments of students. It is observed that HEIs changed policies regarding student's fees and that fee became major source of income for HEIs. In that scenario, HEIs are also facing fierce competition to sustain student's places and remain competitive for them (Thomas et al., 2015). According to Balzer et al. (2015), the government funding is reduced due to economic pressure, and public opinion is also changed regarding HEIs that these are expensive, inefficient and labor intensive. These external challenges forced HEIs changes in processes to make more efficient and satisfactory for all stakeholders.

According to Luo (2017), in 2015 statistics showed that Asian countries sent abroad around 2.3 million degree-seeking students and enrolled an intake of just 928,977 students. The cost of education per student is increasing widely (Mohammed & Yongqing, 2014). Worldwide, HEIs are almost all faced with these challenges, and it is the same scenario in the case of

Malaysia being a developing country (Khairi & Rahman, 2018; Norliza et al., 2017; Grapragasem et al., 2014; Ibrahim et al., 2011). The Malaysian government is also declining funding to public HEIs (Yorkstone, 2019, pp. 141). The prediction is that the international students joining Malaysian HEIs may be decreased as the government recently cut the 15 percent budget for public universities (Luo, 2017). Malaysian guidelines for developing transformation plan (2013) stated that the good governance based on two factors; one efficient and effective performance and resources utilisation and secondly rules and regulation compliance. It raised the need of Lean system application in HEIs. It is depicted that the HEIs in Malaysia can resolve the budget reduction issue and still progress by adopting the Lean system for good governance, which has been shown to be successful in cases of limited resources. Malaysia shows potential to become one of the leading nation among HEIs, as its HEIs are based on the many "quality universities" and branches of well-known international campuses in the country (Bothwell, 2017).

In contrast, the HEIs strategised to invest in advanced technology in order to keep up with the race of competition among national and international institutions. The investment in advance technology ultimately increases their costs. That increased cost is also borne by students and ultimately the institutions became under greater pressure to provide better quality services in order to sustain and compete in the market. This pressure is growing day by day, and students face its cost. Eventually, students' expectations also increased when they have to pay higher costs, and when they have the option of a large number of other institutions to select from (Cotton, 2003). Therefore, institutions are forced to invest enormous amounts into their systems to compete and attract more students with their latest technologies and quality services, just like in an "arms race" (Cotton, 2003). According to Yorkstone (2019) and Kang and Manyonge (2014), HEIs equipping state of art facilities, latest technology, learning environment and improving student experience to compete and increase their quality of services. All these improvements ultimately increased cost of fees, which in turn increased expectations of students. Institutions that do not embrace such tactics and investments, possibly loose large numbers of students (Comm & Mathaisel, 2005b). In this scenario, the higher quality services put more investment and resources to meet their costs despite the proper utilisation of available resources. Kang and Manyonge (2014) argued that the increasing expectations put pressure on HEIs to improve which in fact leading them to the perspective of doing more with less. Campo-Flores (2003) posits that, "because (school) administrators can be more concerned about raising a college's profile than streamlining operations, they don't always act the way a private business might". According to Barber et al. (2013), it will be not clear to predict HEIs policies to spend their funding in coming years, however it is sure that HEIs essentially focus to do more with less, greater value adding, more

'customer' centred, distinguish in its services and develop new teaching strategies. To achieve above goals, HEIs need to be more efficient and this is inevitably possible with business improvement strategies like Lean system. Lean system can bring efficient, competitive and economically sound (Thomas et al., 2015). The literature (Balzer et al., 2015; Kang & Manyonge, 2014; Barber et al., 2013; Campo-Flores, 2003) predicted that the efficiently streamlining the processes is necessary instead of focusing strategies which increased more cost. It is important to understand that how to make HEIs processes more efficient and how could it be streamlined.

Comm and Mathaisel (2005a) postulated that through the Lean system, individual institute can improve by performing efficiently, and each can contribute to higher education development and sustainability. Through the Lean system, resources can be properly allocated and utilised for core competencies and operations can be streamlined on the basis of value adding. Al-Mallah (2005) posited that HEIs can effectively and efficiently work and compete through transforming their system of administrative and educational facilities. The situation can be better improved through proper utilisation of resources instead of following traditional practices, increasing investments and cost of education. According to Rodger (2010), the traditional HEIs follow hierarchical structures, with a culture of royalty where the employee is not empowered, favouritism is promoted, orders are encouraged, and obedience is enforced. This results in labour friction, little faculty member input, repeater students, more part time students, visiting the faculty, a lack of problem solving skills, and lags in the flow of information. This method also produces a large number of graduates, but the graduates' quality is compromised. To compete for the external funding and erudite minds, the HEIs are motivated to redesign business process through reducing administration overheads, improving the delivering service to students, increasing industry liaison, competent faculty member and researches (Svensson et al., 2015). According to ACE (2014) as cited in Waterbury, (2015), since 2000 HEIs discontinuing various traditional practices and beliefs, and it is due to funding reduction and unprecedented competition. The students are getting worldwide education opportunities and mobility. In these circumstances, Lean system is appeared as a viable approach to improve that scenario and to face upcoming challenges. Although its potential is certain, Lean system was not beyond reproach, and its practices remain much debate.

While literatures showed that most of the studies about the Lean system's application in HEIs are customised for particular departments (Ahmad et al., 2016), in academic process (Douglas et al., 2015; Dey, 2007; Emiliani, 2005, 2004), for the administrative process only (Svensson et al., 2015; Salewski & Klein, 2013; Cristina & Felicia, 2012; Doman, 2011; Radnor & Bucci, 2011), or through few or selected principles and tools (Aishah, 2016; Radnor & Bucci, 2011). Some authors (Balzer et al., 2015; Comm & Mathaisel, 2005b) highlighted the importance of

streamlining human resources and technology adoption in it. In the same vein, Sunder (2016b) and Comm and Mathaisel (2005b) recommended efficiently advance technology usage in processes. A broader view adopted by Emiliani (2016) who reported that the practice of technology use in flow of information and streamline processes. Lean system practices of HEIs ensure value adding and wastes elimination in processes (Douglas et al., 2015). The Lean system HEI's infrastructure facilities distances are managed to efficiently utilise time and other resources (Suhaimi et al., 2017; Douglas et al., 2015; Dahlgaard & Ostergaard, 2000). The practices of continuous improvement team, which comprised of internal human resources of faculty member and students, also found in researches (Yorkstone, 2019; Doman, 2011).

Differen studies found Lean system practices in course designing and delivering; i.e. course designing process (Dahlgaard & Ostergaard, 2000), course review process (Sinha & Mishra, 2013), 'Pull' approach in course teaching (Emiliani, 2016), and value adding in curriculum delivery (Waterbury, 2015; Rodger, 2010). In addition to these practices, Sunder (2016b) highlighted to measure student learning. It accomplished by improving practices of examination (Douglas et al., 2015) and student's feedback (Sunder, 2016b; Emiliani, 2016; Rodger, 2010) on their experience. Further, the research (Thomas et al., 2017) highlighted the practices of industry liaison in teaching process. In contrast, the literature showed the Lean system HEIs practice of process standardisation (Douglas et al., 2015; Doman, 2011) and visual management (Yorkstone, 2019; Emiliani, 2016; Sunder, 2016b). Emiliani (2005) diverged attention towards the need of HEIs process standardisation and demand of quality assurance will increase in future. Svensson et al. (2015) suggested identifying practices through which HEIs improve process on continuous bases and follow periodic process reviews. According to Yazdani and Barton (2013), HEI's accreditation bodies usually guide the quality control requirements, in fact benchmarked defined standards of accreditation bodies. Although, Lean system approach provided an opportunity to HEIs to re-orientate and revitalise its operating procedures, which ultimately results in meeting accrediting bodies standards and competitive position in internal and external market. Lean system approach adoption in HEIs reported outcomes including more value added student (Yorkstone, 2019; Sunder & Antony, 2018), students more satisfied (Yorkstone, 2019; Anthony & Antony, 2017; Sunder, 2016b), improved quality of education (Haerizadeh & Sunder, 2019; Sunder & Antony, 2018), resources better utilised (Haerizadeh & Sunder, 2019; Hess & Benjamin, 2015; Comm & Mathaisel, 2005b) and additionally pleasant culture of involvement (Emiliani, 2012; Rodger, 2010). According to Hopen and Cudney (2016), as cited in Cudney et al. (2018), the lean system improve students capabilities in result of improving teaching effectiveness.

Even though the literature showed that the Lean system improved the HEIs, most of the studies considered very limited practices and outcomes. Lean system was mostly used in limited subset of practices, instead of more comprehensive practices. It is noted that in order to succeed Lean system in HEIs, its practices should be adopted holistically because all practices are interdependent. In other words, implementation of one practice could be interrelated to other practices. The literature about Lean system practices reported few practices in HEIs processes; however most of these studies independently investigated particular practice or used particular tools. These studies are not representing the holistic approach of Lean system practices in teaching process of HEIs that empirically investigated all these practices and its outcomes in onerous study. Hence, the literature is lacking on simultaneous and synergistic practices of Lean system in HEIs and its outcomes. This research tried to fill this gap, investigates all practices of Lean system in teaching process of HEIs and its outcomes.

Gupta et al. (2016) admitted the success of Lean adoption in service sector whereas stressed that mostly Lean system implementation reported are based on a few principles or tools of Lean system or for a particular department. Many authors emphasised finding value and non-value adding activities, and concluded that the service processes are slower because of unnecessary complexity and need for a tailored Lean system (Douglas et al., 2015; Gupta et al., 2016; Ahlstrom, 2004; George, 2003; Allway & Corbett, 2002). Number of the researches (Malmbrandt & Ahlstrom, 2013; Balzer, 2010; Radnor, 2010; Kollberg et al., 2007; Ahlstrom, 2004; Comm & Mathaisel, 2003) found frameworks and models to implement Lean system in service sector but most of these do not cover all the principles, or ignored holistic Lean approach, or adoption specific to their organisation case (Gupta et al., 2016). Dos Leite and Vieira (2015) found that Lean brought improvements in cost saving and culture change of the service sector, despite the fact that it is lacking in standard and holistic application in services. Therefore, this research uses a holistic approach to analyse Lean system wider application in the whole institution teaching process instead of concentrating individual process.

Another problem of unemployment is also expanding in different countries and found gap in number of graduates and industry requirement. It seems that HEIs are producing mass production like industries. Comm & Mathaisel (2005b) presume that HEIs became ‘educational factories’, increasing enrolments and expenditures. Emiliani (2005) highlighted some challenges of higher education in the coming years including an oversupply of “capable higher education institutions”. It can be witnessed now worldwide, and Grapragasem et al. (2014) found, that presently Malaysian graduates are facing high unemployment rates. Norliza et al. (2017) states that the MOHE focused on ten objectives among which is producing graduates

who meet the requirements of the market for national and international jobs. It is targeted for graduates to be employed in the right job within six months of graduation and achieving a 75% employment rate (Norliza et al., 2017). Despite of strategizing it, the unemployment rate still increased. According to Haji (2017), it is due to the HEIs offering more degree programs comparative to technical and vocational education (diploma or certificate programs), unable to assess market need, whereas the production of degree graduates from HEIs is far greater than the absorptive capacity in the market. In other words, the researchers' findings about unemployment (Haji, 2017; Norliza et al., 2017; Grapragasem et al., 2014) shows that the HEIs working on the "Push" system instead of the "Pull" system. "Push" system are the cause of many graduates being unable to get suitable job opportunities. The employment issue is rising day by day all over the world due to this "Push" system and the increased in the downsizing of industries (Emiliani, 2004b).

The introduction of the "Pull" system in HEIs is one of the important factors to control this challenge. The "Pull" system means that product is produced as per the customer demand, and this customer demand pulls the product to the market. In contrast, the "Push" and "Batch-and-Queue" systems produce the number of products as per the capacity or prediction, and these are then pushed into the market (Gianluca & Joel, 2017; Sundar et al., 2014). The HEIs processes can be designed to pull service instead of push. The liaison of HEIs and industries can also play an important role in incorporating the "Pull" system. There is a gap and an imbalance between HEIs output and the market needs for human resources (Mohammed & Yongqing, 2014). There are number of public and private HEIs in countries with study programmes (degrees) that are not differentiated from the competitors (Emiliani, 2005). Even in higher education in general, there are many "Batch-and-Queue" features in which product is produced in batches and queued for next operation (Emiliani, 2004b; Comm and Mathaisel, 2003; Alp, 2001; Dahlgaard & Ostergaard, 2000). The Lean system seeks improvement opportunities by managing, through Lean principles, those processes and tools which do not support "Batch-and-Queue" and the "Push" system (Emiliani, 2004b).

It is also found that the theories and practices of service quality are not as well established as those of manufacturing quality (Khairi & Rahman, 2018; Suhaimi et al., 2017; Sunder, 2016a; Hadid et al., 2016; Thomas et al., 2015; Hadid & Mansouri, 2014; Malmbrandt & Ahlstrom, 2013; Douglas & Frendendall, 2004). In service sector, the effective use of quality and being customer oriented is lagging behind the manufacturing sector (Yasin et al., 2004). Emiliani (2004a) states, "In academia, customer-oriented concepts are foreign and frowned upon" (as cited in Doman, 2011). Khairi and Rahman (2018) argued that the service sector is similar to the manufacturing sector as they both serve the customer and both need improvement in

quality, flexibility, and speed of service with minimum cost. This research also aimed to fill this gap and study Lean system practices in academic process.

The pioneer campuses that have adopted the Lean system are mostly US and UK based (Balzer et al., 2015; Antony, 2014; Radnor & Bucci, 2011) and their success stories have attracted other HEIs to reap the benefits of Lean system implementation (Sunder & Antony, 2018; Sunder, 2016a). However, it is observed that the very rare attention had been paid to examine the Lean system in developing countries.

This research attempt to fill highlighted gap in knowledge and provide empirical evidence in favour of the Lean system HEIs practices and its outcomes. This research tried to investigate Lean system HEIs practices comprehensively by using Lean fourteen principles Liker (2004). It is essential to reach a deeper understanding about Lean system HEIs practices and its outcomes.

1.4 Research Questions

Keeping in mind the background and research problems examined in the preceding sections, the main area understudy is “What are the Lean system HEIs practices in teaching process and its outcomes?” To investigate that area, the qualitative research was conducted, the researcher attempted to identify LSHEIs practices and outcomes, and articulated research question are following;

RQ1. What are the LSHEIs practices in teaching processes and Lean System Outcomes (LSO)?

1.5 Research Objectives

These research questions guided the researcher to go deeper into the area of study under investigation.

The main goal of this research is to study the Lean system in HEIs and the specific research aims and objectives to achieve this main goal are listed below;

1. To identify LSHEIs practices in teaching processes and LSO.
2. To integrate LSHEIs practices with 14 Lean Principles in teaching processes
3. To identify the Lean System Outcomes (LSO) in LSHEIs.

Research questions are prerequisite for the articulation of research objectives and methodology. The RQ1 is formulated to find objectives of the research. This qualitative study is based on finding practices through collecting primary and secondary data.

Keeping in view above objectives, the comprehensive literature review is performed in chapter 2 and to study the research questions.

1.6 Significance of Research

This research have four significant contributions providing empirical evidence to cover the gap in the literature concomitant to the existing body of knowledge in the field of the Lean system HEIs practices. Firstly, it explored Lean system application in the service sector of higher education. There is limited research on Lean system particularly in teaching process of HEIs, which showed a holistic approach. It expanded the concept of Lean and its adoption in a higher education system, where the implementation of management models is usually more complex and difficult. According to Comm and Mathaisel (2005b) and Khairi and Rahman (2018), very little research focused on Lean in higher education whereas the hindrance of little research is less awareness of Lean applications in the service sector and HEIs. Specifically, this research attempted to ascertain Lean system HEIs practices and its outcomes.

Secondly, to the best of our knowledge, there is very limited previous study on Malaysian HEIs about Lean system (Khairi & Rahman, 2018). It studied the LSHEIs practices in the Malaysian International university. It focused on the responses of faculty members and students; whose needs require understanding; they directly benefited from its findings, and they are one who faces the changes in the system on Lean system implementation.

Practically, this research could offer reccommendations to HEIs and practicioners, and deeply understand Lean system implementation in HEIs teaching process. It expanded new research areas in extending the Lean system practices and its application in HEIs, which can be further tested and developed in future studies. It will identify comprehensive LSHEIs practices for HEI's teaching process. LSHEIs practices will help HEIs to reduce wastes in process and add maximum value within limited resources. According to Emiliani (2005), "…the time is right for higher education administrators, faculty and staff to begin applying Lean Management to their business. The consequences of not doing so could be fatal." This research will help HEIs to cope up the challenges faced by them. It raised awareness to apply Lean system in HEIs setup.

Research Scope

This research is focused to provide a holistic approach, which aims to identify LSHEIs practices and LSO in teaching processes. The qualitative method is used to identify LSHEIs practices and LSO, and integrated LSHEIs practises with Lean 14 Principles.

1.7 First of all qualitative data was collected from worldwide experts of Lean system HEIs in addition to the University of Nottingham Malaysia campus, as a private and international HEI in Malaysia. The data was collected from faculty members and students in addition to experts, through interviews in order to evaluate LSHEIs practices in teaching processes. Faculty members and students were selected because they are the most important stakeholders of HEIs processes and both can play vital role in improvement.

Operational Definitions

1.8 The definitions of main key terms are discussed below;

Higher Education

1.8.1 Higher Education is a post-secondary education which imparts knowledge, skills and habits in incoming students in such a way that after completion the student plays a positive role in society and industry. OECD (2010) states that a country's productivity and high wage employment depends on effective knowledge transfer, creation, and application. These qualified, highly specialised and skilled human resources play a vital role in a country's competitiveness and economy.

1.8.2

Higher Education Institutions

Higher Education Institutions are organisations, which impart higher education after secondary education; it included universities, colleges and vocational centers. Higher Education Institutions play a vital role in this process of knowledge and skills transfer which moulds individuals into productive and useful human resources (Mohammed & Yongqing, 2014). In HEIs, the students do not only made capable to earn but also prepare them for life (Sunder, 2016a). The end product of HEIs are educated student with desired knowledge level (Sunder, 2016b). In this way, HEIs mainly contribute a nation's development and to the growth of the market's manpower (Al-Mallah, 2005). Nowadays, worldwide HEIs first priority is to provide quality services (Narayanamurthy et al., 2017; Ali et al., 2016). The aim of HEIs is to provide quality education to undergraduate and graduate students, in parallel delivers research

(Yorkstone, 2019). Accoring to Svensson et al., (2015), the HEIs mission is to generate, create, protect, exchange and scatter knowledge.

HEIs practices

The HEIs practices are the way of doing process of education and teaching, which has been a common notion as training and delivering, respectively (Wan & Sirat, 2018; Pring et al., 2009). The HEIs practices are different set of performing methods through HEIs transform
1.8.3 individual into useful human resource equipped with technical and social skills. HEIs are service industry and possess its characteristics including intangible, customer (student) part of the process, heterogeneous, perishable, variable, and inseparable from the person delivering (Shank et al., 1995), which has effect on its practices. The role of HEIs practices is important to consider in efficient and effective HEIs.

Lean System

1.8.4 Lean system is a process improvement concept in which focus is to eliminate or reduce waste in process, while cater value adding concept within limited resources. According to Womack & Jones (1996-2003), the Lean system is "the endless transformation of waste into value from the customer's perspective". It has set of principles and practices to establish emphasis customer focus and achieving quality excellence. It is management philosophy, which applies its tools and techniques to reduce waste and improves quality (Waterman & McCue, 2012). Lean system practices play an important role in improving performance to achieve set goals and quality excellence. From the Lean system perspective it encompasses the process
1.8.5 centred with value adding, elimination of waste, and efficient resources utilisation.

Lean System Outcome

1.9 Lean system outcomes are the performance output as a result of implementing Lean system practices, and it is influenced by the stragies and practices.

Thesis Outline

The thesis has been structured into five chapters. The brief outline of the contents of each chapter is as follows:

Chapter 1 provides the overview of the research, its background and the problem, which provides the basis for conducting this research. It shows the research questions and specific objectives of this endeavour. It highlights the research scope, significance and operational definitions. It outlines the structure of the thesis and serves as a roadmap to go through the whole research process.

Chapter 2 reviews the literary contribution of other researchers; it began with Lean system and its interrelated concepts in manufacturing industries. The chapter begins with the Lean system definition philosophy, wastes and limitations. It reviews Lean principles, its adoption in HEIs and challenges of the Lean system. It discusses literature evidences of the Lean system implementations cases in the HEIs.

Chapter 3 shows the different research methods and techniques adopted and the rationalizing research. It covers the literature on chosen philosophical assumption, research design and gives justification for the choice of methodology. It provides details of the sampling method and the data collection method. It helps the reader to figure out the research analysis, reliability and validation process conducted in this research.

Chapter 4 contains the results and analysis extracted from research data. The chapter shows an analysis of the qualitative data with all codes generated for LSHEIs practices related to Lean 14 principles and LSO.

Chapter 6 combines discussion on the results of qualitative phase, and depicts the conclusion and perspective of this research according to the research questions. The chapter discusses the Lean system HEIs practices and LSO with reference to the literature and the results in the analysis. It outlines a critical discussion of the agreement between the results and previous research. It concludes the key findings from the results obtained, its implications and limitations. It restates the purpose of the study and challenges faced in achieving the endeavour, as well as concluding remarks.

CHAPTER 2

Chapter 2 Lean system in Higher Education Institutions

2 This chapter is divided into three main parts. It begins with perceptions of the Lean system in manufacturing and service industry, while discussing its definition, philosophy, wastes and limitations.

The second part is a discussion on its principles, the Lean system applications in HEIs, the gaps in the research, misconceptions, initiation, outcomes and challenges in its adoption. It also reveals the drive of the Lean system programmes in different HEIs. This chapter develops the theoretical foundations, which will be used in chapter three for the research design and data analysis approach.

2.1 Lean System

Lean system was rooted in the manufacturing sector, particularly the automotive industries, then its success and effectiveness in improvement moved it to the service sector and to the public sector as well (Radnor & Bucci, 2011). Since the 1970s, there has been evidence found in the literature about the shifting of the manufacturing paradigm to the service sector and its benefits (Radnor & Bucci, 2011; Bowen & Youngdahl 1998; Levitt, 1972). Some of the first manufacturing industries which deployed the Lean system in their administrative process are the same as those which successfully implemented it in their manufacturing process (Svensson et al., 2015).

2.1.1 This first section presents the Lean system overview with its definition, philosophy, wastes and limitations in its applications in manufacturing and service sector.

Definition of the Lean system

The leading researcher of the International Motor Vehicle Program (IMVP) was Krafcik who first to coin the “Lean” term, and referred it to the system of utilising fewer resources in production as compared to mass production (Mostafa et al., 2013; Papadopoulou & Ozbayrak, 2005; Krafcik, 1988). Lean referred to the manufacturing approach that half less of human effort, manufacturing space, tools investments, inventory and time in developing new product,

which ultimately results into fewer defects and produce greater variety of products (Womack et al., 1990, pp. 13).

The hypotheses developed from the Liker (1996, pp. 481) Lean perception, was that the Lean is a philosophy which eliminates sources of waste and improve delivery time to customer. The American Production and Inventory Control Society (APICS) Dictionary (Cox & Blackstone, 1998) emphasised on minimisation of resources and non-value adding activities, with multi skilled workforce and flexible operations.

Many researchers consider Lean system in a different perspective. There is no consistency in definition, as it is due to the length it took to evolve and became mistakenly interpreted with other quality approaches (Gupta et al., 2016; Hopp & Spearman, 2004; Spear & Bowen, 1999; Womack et al., 1990). Massachusetts Institute of Technology (MIT) provided a clearer insight and philosophy of the Lean system. In the framework of the Lean Advancement Initiative (LAI) (MIT, 2000), Leanness is described as a set of practices which make up people perception of 'value' and accordingly transform behaviour.

However, Papadopoulou and Ozbayrak (2005) emphasised that there is gap of holistic implementation of Lean system particularly at the enterprise level. A Lean enterprise "is a business organisation that delivers value to its stakeholders, with little or no superfluous consumption of resources (materials, human, capital, time, physical plant equipment, information, energy)" (Papadopoulou & Ozbayrak, 2005; Helling, 2001; MIT, 2000). At the enterprise level, the Lean system holistic implementation is rarely documented in the literature. According to Papadopoulou and Ozbayrak (2005), the clear insight of a Lean enterprise which is recognised as in the current state is only traced in the work of research group LAI at MIT. Therefore, the evolution of the Lean system at the enterprise level is credited to the MIT research group (Papadopoulou & Ozbayrak, 2005). Emiliani et al. (2003) outlined Lean as a management system which is responsive to the requirements of people in business and foremost stakeholders, all delivered with better outcomes (as cited in Ingelsson & Martensson, 2014).

According to Toussaint and Berry (2013), the Lean system is a cultural transformation of any organisation. Emiliani (2010) states, as cited in Ingelsson and Martensson (2014), that if an industry is struggling to attain "real Lean" then it is required to bring two main values-continuous improvement and respect for people . According to Gupta et al. (2016), Lean is not a tool box of improvement in quality but instead of this, it is a practical philosophy, a way of thinking and culture in which tools or practices are source to implement.

Lean is established as a system, which encompasses value with cultural transformation (Shah & ward, 2007; Hopp & Spearman, 2004; Womack & Jones, 1994). The number of authors defined Lean system in terms of reducing or eliminating waste, main focus is waste centered Lean approach (Burgess & Radnor, 2013; Wilson, 2010; Radnor, 2010; George, 2003; NIST, 2000; Schonberger, 1986). The other perspective of Lean system is found as efficient and effective use of resources or to manage same demand with in limited resources (Modig & Ahlstrom, 2012; Hallgren & Olhager, 2009; Abdi et al., 2006). It is established as cultural transformation which promotes 'value' (Gupta et al., 2016; Bhasin & Burcher, 2006; Liker, 2004; Sanchez & Perez, 2004; Karlsson & Ahlstorm, 1996; Shingo & Dillon, 1989). Although the Lean system has been explored and recognised, many industries are still on the path to becoming or staying "Lean" (Taj, 2008).

The foremost literature on the Lean system shows that it lacks the concrete definitions of Lean (Arlbjorn & Freytag, 2013; Hallgren & Olhager, 2009; Pettersen, 2009; Shah & Ward, 2007; Holweg, 2007; Papadopoulou & Ozbayrak, 2005). According to Shah and Ward (2007), the lack of clarity is due to the multiplicity of terms and descriptions posited regarding the Lean system. The fact that the Lean system evolved over time is one of the reasons for the ambiguity (Shah & Ward, 2007; Hopp & Spearman, 2004; Spear & Bowen, 1999; Womack et al., 1990).

Secondly, there is substantial disagreement about Lean system elements, the measurement of performance and a framework which leads to confusion in its definition (Bhamu & Sangwan, 2014; Shah & Ward, 2007). The common aspect found in different reviews is that Lean is mainly focused on value concept, value adding activities and ultimately eliminates or reduces wastes and non-value adding. This process is continuous and needs cultural transformation to understand the required changes in existing resources utilisation. In HEIs, it is termed as a methodology which provide more with less (Comm & Mathaisel, 2005b) and create low cost improvements by reducing muda (Dahlgaard & Dahlgaard-Park, 2006). It is found substantial that Lean is a system, which results into value addition, waste reduction, cultural transformation and improvements. It is important to understand its philosophy, principles and waste concepts, which results into cultural transformation, value addition and improvements. The next sections lead to understand Lean system philosophy, waste concept, limitations and then principles.

From the pertinent literature, the definition of the Lean system adapted in this study is as following,

"The Lean system is adding value and reducing or eliminating waste throughout the process within limited resources with cultural transformation."

Lean Philosophy

2.1.2 The Lean system evolved and emerged as both a philosophical and practical approach (Boyle et al., 2011). The philosophical approach encompasses the objectives in context of culture change in an entire industry, and the industry focus to bring transformation to the Lean system with continuous improvement. The culture change means practices of empowerment, ownership, trust, sharing responsibility and skills, decision-making opportunities, openness to learning and experimentation, and leadership support (Emiliani, 1998; Senge, 1996). The number of researchers (Holweg, 2007; Shah & Ward, 2007; De Treville and Antonakis, 2006; Alukal, 2003; Comm & Mathaisel, 2000; Liker & Wu, 2000; Cox & Blackstone, 1998; Liker, 1997) took Lean system as a philosophy. The practical approach encompasses value concept, waste elimination and the appropriate consumption of resources throughout the process from supplier to customer, and application of the tool and techniques (Bhamu & Sangwan, 2014). The Lean system became an important resource to gain a competitive advantage and discovered tools and methods to adopt in manufacturing industries (Li, 2013; Patricia & Maike, 2012; Ferdousi & Ahmed, 2010; Ehret & Cooke, 2010; Abdulmalek & Rajgopal, 2007; Hino, 2006; Hunter et al., 2004).

The Lean system is seen as a new manufacturing approach in which a continuous improvement culture encouraged industry to reduce and eliminate waste from processes and to produce the same product with less cost and resources. The same perspective was underlined at its inception as a holistic approach towards manufacturing which found applicable as a whole or total system. It connects the industry system and process from design, planning, procurement, maintenance, operation, quality, and even to supplier and customers (Papadopoulou & Ozbayrak, 2005).

The Lean system has been adopted in the manufacturing sector by three capabilities that are process capability, learning capability and evolutionary learning capabilities (Fujimoto, 1999). In the process capability phase, the need is to scan the process through value stream mapping and to identify wastes and non-value adding activities. The focus in process capability is to achieve customer satisfaction through increasing value adding activities (Radnor et al., 2012; Modig & Ahlstrom, 2012; Fujimoto, 1999). In the learning capabilities phase, the objective is to identify problems, their solution and sustainability (Fujimoto, 1999; Jones et al., 1997). In the evolutionary learning capability phase, efforts are made to explore innovation and new ways to perform the process (Mazzocato et al., 2014).

Lean Wastes

2.1.3 The practical approach of Lean system is found dependent on value concept and waste elimination. Liker (2004) first two principle levels and five principles (Womack & Roos, 1996) first four principles focused on 'value' and waste concepts. Value is what the customer wants and desires to pay to achieve it, and the contractor produce it to satisfy the customer (Oehmen et al., 2012). According to Kang and Manyonge (2014), the activity is not waste if it values to customer and delivering what customer wants. Indeed, value is defined by customer and the actions which utilising resources and does not deliver value to the customer will be 'waste' (Yorkstone, 2019; Maciag, 2019). Womack and Jones (1996/2003) defined waste as, "Any human activity that absorbs resources but creates no value". Lean "waste" is named with different terms in Japanese: *muda* (waste), *muri* (overburden) and *mura* (unevenness) (Radnor & Bucci, 2011). The original seven wastes, which are categorised under the 'muda', are identified by Ohno (1988), and the eighth waste is identified by Emiliani (1998), are given below in Table 2-1; for the Manufacturing (Ohno, 1988) and Service Sectors (Emiliani & Stec, 2004).

Table 2-1 Types of Lean Waste

Sr.no.	Type of Wastes	Manufacturing Sector wastes	Service Sector waste
1.	Overproduction	Making extra products than customer demand.	Doing work that is not requested by customers.
2.	Waiting	Man or machines waiting for work.	Delays in reviews and approvals.
3.	Transportation	Transporting route or delays.	Movement of document takes long.
4.	Processing	Processing itself beyond the customer required.	Processing itself may be over processed which not required.
5.	Inventories	Raw material, work-in-process (WIP), and finished products.	Data, work-in-process (WIP), and completed services.
6.	Moving	Unnecessary man and machine movement.	Man extra movement may be in search of information.
7.	Defects	Produce defective products so rework for correction.	Errors or mistakes in data or documents and reworks.
8.	Behaviors (Emiliani, 1998)	Behaviors that do not add value.	Behaviors that do not add value.

Sources: Information from Emiliani and Stec (2004)

Wedgwood (2007) contends that waste elimination is essential to streamline processes. George (2003) argued that the waste recognition is the biggest challenge in any service sector. Seddon et al. (2009) suggested that the cause of waste should be identified, and then analyse it to address its removal in future.

Limitations and Barriers of the Lean System

The prevailing literature argues that the Lean system is needed to be applied beyond manufacturing, and not considered only alone in manufacturing (Bhasin, 2012; Eisenhardt & Martin, 2010; Haskin, 2010; Cocolicchio, 2008; Womack et al., 2003). Hines et al. (2004)
2.1.4 demonstrated that the distinction of the Lean system at the strategic and operational level is essential to be clarifying as a whole with right strategies and tools in order to bring value to customer.

The literature review showed that the Lean system adoption and implementation is still facing difficulties (Bhamu & Sangwan, 2014; Bhasin & Burcher, 2006), and conflicts exist mainly due to the culture and sub cultures of industry (Atkinson, 2010; Jones, 2009; Ransom, 2008; Hunter, 2004). The Lean Enterprise Institute (LEI) web surveys (LEI, 2005, 2004) manifested that the backsliding to the traditional ways is one of the dominant factor leading to the Lean system failure. As there is no fixed recipe to gain prompt success in the adoption and implementation of the Lean system, and different industries initiation face different factors and constraints (Bhasin, 2012; Singh et al., 2010). The lack of communication in industries also impact the Lean system implementation (Waterbury, 2015; Bhasin, 2012). The industries first need to spend different resources on training and implementation (Jones, 2009), and then the organisational structure also influence on its adoption and progression (Ransom, 2008). It is found that the large plants have more resources to implement Lean system extensively as comparative to smaller industries (Bhasin, 2012; Saurin et al., 2011). According to Bhasin and Burcher (2006), the main barriers faced by industries in implementing the Lean system are lacking in direction, planning and appropriate project sequencing.

It is suggested that the Lean system adoption requires at least five years time frame, which is also one limitation in its adoption (Bhasin, 2012; Womack & Jones, 2005). The Lean system implementation requires long-term commitment and industries unable to precede it's never ending adoption and continuous efforts in identification of new problems and wastes in the practices (Saurin et al., 2011; Eisenhardt & Martin, 2010). It is also found that the industries usually don't have post-implementation planning, in which its outcomes and analysis is involved (Bhamu & Sangwan, 2014; Mohanty et al., 2007). Emiliani et al. (2007) claimed that Lean implementations abolished and did not continue in case of a change in leadership, as cited in Waterbury (2015).

In 1990s, the preliminary initiatives were made to adopt the Lean system in the service sector. The challenges faced in the initial attempts were a lack of awareness of its benefits, fear of waste identification meddling with the process and a few others (Gupta et al., 2016). Now Lean evidences are also found in service sectors where the Lean system is tailored with a

service perspective and characteristics (Gupta et al., 2016; Hasle et al., 2012; Staats et al., 2011; Laureani et al., 2010; Fillingham, 2007; Hanna, 2007; Liker & Morgan, 2006; Ahlstrom, 2004). The researchers found a human-centric approach for Lean adoption in the service sector (Sarkar, 2008; Liker & Morgan, 2006; Abdi et al., 2006). However, further rigorous research in the service sector will encourage managers to adopt the Lean system with more motivation and interest (Fullerton & Wempe, 2009).

The literature makes clear that there are different limitations and barriers faced during or post adoption of the Lean system, or some constraints found in its smooth implementation. To overcome these limitations and barriers, it is worth evaluating the benefits of the Lean system through other than tradition means, and clarify its tangible and intangible effects (Bhasin, 2012; Vinodh & Balaji, 2011; Dalal, 2010). It is suggested to adopt Lean system on long-term basis despite being project oriented (Gupta et al., 2016; Sunder, 2013). It is reported that the evidences of the Lean system in international peer reviewed journals are lacking and requires sound conceptualisation (Arlbjorn & Freytag, 2013). The leadership support and cultural transformation is essential and challenging elements in success of Lean system adoption. The authors stress the significance of cultural transformation through respect for people, motivation and empowerment, which is possible with the commitment of leadership and management (Lu et al., 2017; Hadid et al., 2016; Malladi et al., 2011; Seddon et al., 2009; Sarkar, 2008; Abdi et al., 2006; Raifsnider & Kurt, 2004; Poppendieck, 2002; Spear & Bowen, 1999). Alsmadi et al. (2012) argued that the service sector needs to focus more on the social practices of the Lean system as opposed to its technical practices. Their research was based on 135 service firms and concluded that Lean social practices directly influenced performance and cost. Hadid et al. (2016) advocates that the socio and technical side both synergy yield better operational and financial performance.

This research is expanding body of knowledge in that area to overcome limitation of conceptualisation. In addition to this, it is helpful in clarifying direction in its successful adoption during and post implementation.

Lean Principles

Womack and Roos (1996) posit the five principles and elaborated that ‘value’ is not only considered in end product but also focused throughout the chain of processes. Its identification is possible through second principle of value stream mapping, in which focus on value and resources utilised accordingly in each step of process. In third principle of Creating flow, the process is continuing flow while minimising muda (waste) and redesigning of process to ensure it. Fourth principle of ‘pull’ believes that the customer is the driver of value stream and

produced according to its requirement, minimising inventory system. Lastly, perfection or continuous improvement means pursuit these practices and getting its benefits. Hence, Womack and Jones (2003) studied five Lean principles in which defined value as per customer perspective, value stream mapping, creating value flow, bring 'pull' system instead of 'push' and after aligning previous four principles focus towards perfection.

Liker (2004) defined 14 Lean principles under the main four categories of philosophy, process, people and partners, and problem solving, as shown in figure 2-1. It is also known as 4P model, based on four levels to achieve sustainable Lean system implementation. In this model, each level has defined purpose; at first level of 'philosophy' it is important to focus customer requirements and defining 'value' as per customer perspective. Then entire organisation work accordingly and decisions are made for long term. It is derived from the Womack and Roos (1996) first out of five principles of 'define value'. At second and process level, wastes are reduced or eliminated and mapping processes on basis of 'value' concept defined at first level. This level is derived via the combination of Womack and Roos (1996) three principles, namely value stream mapping, create flow, and Pull system. At third level, people and partners is posited to develop culture and environment in which people are encouraged to participate in creating 'value' and growth through promoting Lean philosophy. People including customers, leaders, staff and all other in supply chain get respect and considered their role is important in creating 'value' throughout the processes. This principle was not addressed in Lean five principles postulated by Womack and Roos (1996). At fourth and last level of problem solving, it is focused to continuous improve and solve problems by focusing its root causes. This level is derived from the Womack and Roos (1996) last principle of 'continuous improvement' or 'Kaizen'. Liker (2004) defined TPS two pillars- continuous improvement (Kaizen) and respect for people.

Various studies (Chauhan & Singh, 2012; Sanchez & Perez, 2004; Karlsson & Ahlstorm, 1996) showed use of different or selected principles use in their research of Lean system in particular sector, e.g. continuous improvement, pull, value. Kaltenbrunner et al. (2017) studied Lean system in Health sector through Liker's 14 principles. According to Radnor and Walley (2008), the all five Lean principles are found applicable to public sector, whereas customised further as per the focus of organisation. For HEIs, Dahlgaard and Ostergaard (2000) claimed that the customisation of Lean principles is essential for implementation.

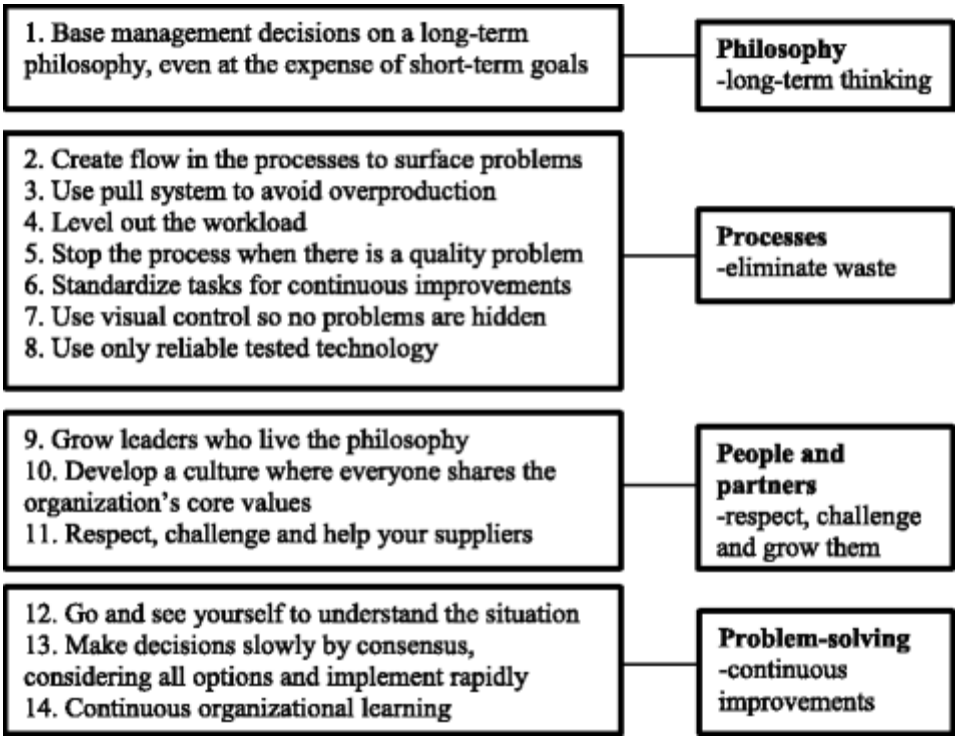

Figure 2-1 Liker's (2004) Lean 14 Principles
Source: Liker (2004) as cited in Kaltenbrunner et al. (2017)

The Lean five principles are effective in constant and consistent delivering value to the customer (Kang & Manyonge, 2014). The Lean five principles by Womack and Roos (1996) cited frequently established as a practical step-by-step application approach, however got some criticism on lacking of human resource and cultural concern inclusion in it. In addition to this, Spear and Bowen (1999) postulated four core aspects in adopting of Lean system in industry sector and Shah and Ward (2007) put forward the framework for Lean system lacking decentralised decision making and long term perspective. Lean 14 principles (Liker, 2004) found generic, including both philosophical and practical perspective. Liker's 14 principles (Liker, 2004) mainly derived from Lean five principles, considered additional human resources and cultural aspect. In this study, the Liker's fourteen principles are chosen to study in HEIs, which also incorporates Lean five principles.

2.3

Lean System in Higher Education Institutions (HEIs) and its Outcomes

HEIs are not the only institutions that conserve, extend, disseminate, and create knowledge. They are intellectual focal points in society and play a vital role in nation building. On top of

this, they also contribute to economic growth and development through talent, skill, technological transfer, and the preparation of useful human resources (Wan & Sirat, 2018; Ahmat, 1980). Worldwide changes have brought drastic growth in competitive advantage and economic changes, which have motivated the HEIs to redesign both their academic and administrative systems. In this change, the deliverable services have improved for student, faculty member, industry, and researcher in academic as well as administrative positions and infrastructure (Sunder & Antony, 2018). The HEIs are improving day by day and things are becoming more systematic through quality improvement and other business process techniques like 5S, cause and effect analysis, Value Stream Mapping (VSM), etc. (Yorkstone, 2019; Svensson et al., 2015). This is one of the reasons that there is a visible increase in the HEIs interest in the Lean system, six sigma and other quality improvement techniques (Svensson et al., 2015).

The rising cost of public and private HEIs opened the door to adopt business excellence and improvement techniques to sustain them. The Lean system is the best fit to encompass these upcoming challenges (Bandyopadhyay & Lichtman, 2007). Hess and Benjamin (2015) posited that the current economic scenario created pressure on HEIs from all stakeholders; such as student seeking advancement and relevant curriculums, faculties looking for opportunities to grow their career and skills, HEI's business sponsors emphasising expense reduction by streamlining processes, advisor and administrators expecting proper utilisation of funds and facilities, and others.

The HEIs are facing not only these internal pressures but also external pressures like competitors in the market, graduates' employment, and others. All these pressures are creating room to adopt the Lean system and bringing cultural change to enable its adoption in the setting of HEIs (Hess & Benjamin, 2015). According to Bandyopadhyay and Lichtman (2007), the past decade's major quality changes initiated in the HEIs of the USA are based on the continuous improvement methodologies. They utilised Quality Function Deployment (QFD) methodology to find customer needs satisfied in designing and evaluation of the program and involved many internal and external stakeholders.

While explaining the practitioners' point of view, Svensson et al. (2015) stated that the traditional HEIs decentralisation is one of the causes of slow adoption of LSS (Lean Six Sigma); in addition to this, HEIs are complex organisation with multiple inputs and resources consumption. It requires streamlining its primary functions of education, research, and innovation. Antony et al. (2012) argued that cultural resistance is the main challenge in adopting the Lean system and other Continuous Improvement (CI) methodologies. They found assessment instruments to evaluate the institutions' readiness to adopt change through CI

methodologies. Sunder and Antony (2018) confirmed that the Lean system is applicable in HEIs for achieving quality excellence. The number of authors (Yorkstone, 2019; Thomas et al., 2017; Sunder, 2016b; Thomas et al., 2015; Balzer et al., 2015; Radnor & Bucci, 2011; Emiliani, 2005, 2004) presented Lean implementation in HEIs and bring positive impact on this sector. According to Sunder (2016b), the HEIs adapting Lean system bring quality excellence and continuous improvement. However, Yorkstone (2019) found number of the drivers for establishing process improvement capability in HEIs, which are improving effectiveness and efficiency within the institution, student and staff experience, service excellence, strategic plan, leadership interest and reputation, respectively. The study (Yorkstone, 2019) surveyed and followed up interviews from HEIs in Europe, USA, Canada and Australia, and found that USA and Canada showed statistically growth in HEIs process improvement capability since 2010, whereas Europe and Australia had limited until 2013 and then increasing.

There was an international collaboration between five multinational companies and five European HEIs through project of Lean Learning Academy. It focused engineers training program on Lean system, and resulted an alternative to traditional approach of teaching in engineering programs (Carvalho et al., 2013), as cited in Cudney et al. (2018). Haerizadeh and Sunder (2019) presented a case study to implement LSS framework in HEIs. The case study confirmed successful LSS applicability in HEIs setup an improved system and quality of education. It results increase in student satisfaction levels, enrolments and decrease in student waiting time. In Portsmouth University, two individuals implemented Lean system in addition to their primary responsibilities. They deployed Rapid Improvement Workshops (RIWs), process mapping and flow charts (Radnor & Bucci, 2011). An Irish HEI also adopted LSS and simplified number of administrative processes. It showed promising results of improvements in cost saving, cycle time reduction, waste reduction, staff and student satisfaction (O'Reilly et al., 2019).

The research showed that Lean system adoption is mostly found in the USA and European HEIs and very rare traces are found in Asia, Africa, and Australia. The number of HEIs embarked Lean system implementation is listed in Table 2-2.

Table 2-2 HEIs Implementing the Lean system in Different parts of World

Sr. no.	Continent	country	Public/ Private	University	References
1.	**Europe**	Wales, UK	Public	Cardiff University	(Nadeau, 2017; Sunder, 2016b; Svensson et al., 2015; Balzer et al., 2015; Radnor & Bucci, 2011; Antony, 2014)

2.		UK	Public	University of Nottingham (Business School)	(Nadeau, 2017; Sunder, 2016b; Radnor & Bucci, 2011)
3.		UK	Public	Portsmouth University	(Nadeau, 2017; Radnor & Bucci, 2011)
4.		UK	Public	University of St Andrews	(Yorkstone, 2019; Narayanamurthy et al., 2017; Nadeau, 2017; Sunder, 2016b; Svensson et al., 2015; Waterbury, 2015; Balzer et al., 2015; Radnor & Bucci, 2011; Antony, 2014)
5.		UK	Public	Warwick University (Business School)	(Nadeau, 2017; Sunder, 2016b; Radnor & Bucci, 2011)
6.		UK	Public	University of Sheffield	(Yorkstone, 2019; Balzer et al., 2015)
7.		UK	Public	University of Stirling	(Balzer et al., 2015)
8.		UK	Public	University of Aberdeen	(Balzer et al., 2015)
9.		UK	Public	University of Strathclyde	(Balzer et al., 2015)
10.		UK	Public	Edinburgh Napier University	(Balzer et al., 2015)
11.		Netherla nd	Public	HAN University of Applied Sciences	(Balzer et al., 2015)
12.		Sweden	Public	KTH Royal Institute of Technology	(Nadeau, 2017)
13.		Sweden		Gotland University,	(Aishah, 2016; Isaksson et al., 2013)
14.		Finland	Public	Turku University of Applied Sciences	(Nadeau, 2017)
15.	**America**	USA	Public	University of Central Oklahoma (UCO)	(Yorkstone, 2019; Narayanamurthy et al., 2017; Nadeau, 2017; Sunder, 2016b; Waterbury, 2015; Balzer et al., 2015; Cristina & Felicia, 2012)
16.		USA	Public	University of New Orleans (UNO)	(Nadeau, 2017; Balzer et al., 2015; Malanda, 2015; Waterbury, 2015; Balzer, 2010)
17.		USA	Public	University of Michigan	(Narayanamurthy et al., 2017; Balzer et al., 2015; Waterbury, 2015)
18.		USA	Public	University of Iowa	(Nadeau, 2017; Balzer et al., 2015; Malanda, 2015; Waterbury, 2015; Balzer, 2010)
19.		USA	Public	University of California, , Berkeley	(Balzer et al., 2015)
20.		USA	Public	University of Washington	(Narayanamurthy et al., 2017; Malanda, 2015; Balzer et al., 2015)
21.		USA	Public	University of Minnesota	(Balzer et al., 2015; Cristina & Felicia, 2012)
22.		USA		Winona State University (WSU)	(Waterbury, 2011)
23.		USA	Public	University of Virginia	(Narayanamurthy et al., 2017; Balzer et al., 2015)
24.		USA	Public	University of Texas at Dallas	(Balzer et al., 2015)
25.		USA	Public	Miami University	(Narayanamurthy et al., 2017; Balzer et al., 2015)
26.		USA	Public	Central Connecticut State University	(Svensson et al., 2015; Antony, 2014)
27.		USA	Public	Tarrant County College	(Balzer et al., 2015)
28.		USA	Public	Des Moines Area Community College	(Balzer et al., 2015)
29.		USA	Public	University of Northern Iowa (UNI)	(Balzer et al., 2015)

30.		USA	Public	Bowling Green State University	(Nadeau, 2017; Balzer et al., 2015; Waterbury, 2015; Balzer, 2010)
31.		USA	Public	Oakland University	(Nadeau, 2017)
32.		USA	Public	University of Wisconsin–Madison	(Narayanamurthy et al., 2017; Sunder, 2016b; Malanda, 2015)
33.		USA	Public	University of South Dakota	(Nadeau, 2017)
34.		USA	Public	California Polytechnic State University	(Nadeau, 2017)
35.		USA	Public	Old Dominion University	(Nadeau, 2017)
36.		USA	Private	University of Scranton	(Waterbury, 2015; Balzer et al., 2015; Balzer, 2010)
37.		USA	Private	Rensselaer Polytechnic Institute	(Nadeau, 2017; Waterbury, 2015; Balzer et al., 2015; Balzer, 2010)
38.		USA	Private	University of Notre Dame du Lac	(Balzer et al., 2015; Malanda, 2015)
39.		USA	Private	Massachusetts Institute of Technology	(Svensson et al., 2015; Antony, 2014)
40.		USA	Private	Universidad Popular Autónoma del Estado de Puebla	(Nadeau, 2017)
41.		Canada	Public	Carleton University	(Balzer et al., 2015)
42.		Canada	Public	University of Waterloo	(Balzer et al., 2015)
43.		Canada	Public	Saint Jerome's University	(Balzer et al., 2015)
44.		Canada	Public	Wilfrid Laurier University	(Balzer et al., 2015)
45.		Canada	Public	University of Saskatchewan	(Balzer et al., 2015)
46.	**Australia**	Australia	Public	Macquarie University	(Yorkstone, 2019; Balzer et al., 2015)
47.	**Asia**	Saudi Arabia	Private	King Abdullah University of Science and Technology	(Nadeau, 2017; Svensson et al., 2015)
48.	**Africa**	South Africa	Public	Tshwane University of Technology (TUT)	(Nadeau, 2017; Malanda, 2015).

Source: Author

The literature showed that HEIs adoption of the Lean system were based on the following practices: 5S, standardised work, VSM, JIT, Visual Management (VM), inventory management, process mapping, single piece flow, seamless data flow, flow of services, waste elimination, Kaizen, employee empowerment, customer focus, optimised capacity use, A3 Report, teambuilding, brainstorming, value vs. waste (Antony et al., 2012; Doman, 2011; Comm & Mathaisel, 2005b; Sunyog, 2004; Emiliani, 2004a). The most common Lean practices adopted in HEIs are value stream mapping (VSM), Kaizen, waste identification and elimination, standardisation, 5S, visual management, HR management and cultural change (Yorkstone, 2019; Antony et al., 2012; Staats et al., 2011; Radnor, 2010;

Barraza et al., 2009; Koning et al., 2008). Thomas et al. (2017) found that the most common practices followed in HEIs settings are 5S, VSM, workload levelling and pareto in recruitment, finance, library, workshop and different department academic processes. It showed that different Lean system practices are adopted in different HEIs.

Moore and Nash (2004) presented case study of the University of Oklahoma in which applied Lean system in its administrative process for cost and waste reduction. That case study based on application of VSM and Kaizen 4 stage implementation processes. Tischler (2006) discovered Lean system application in student application process through VSM and IT integration with 5-step improvement method. Hines and Lethbridge (2008) explored Lean system initiatives and studied applicability of Lean Iceberg Model through literature review and semi structured interviews from HEIs in USA. It was found that Lean adoption in academic environment is harder comparative to other industries. Salewski and Klein (2009) implemented Lean system in HEIs through five stages plan and studied drivers and conditions desired to implement Lean system. They found that communication and leadership support are essential to adopt Lean system successfully. Kanakana et al. (2012) applied LSS in HEIs of South Africa in which concluded that Lean system is essential to gain potential improvement benefits in addition to integrate approaches. Isa and Usmen (2015) used VSM to trace value adding and non-value adding activities in facilities management in HEIs and in addition to it performed cost analysis of it. Thomas et al. (2017) studied implementation case study in UK based eight HEIs, and focused the new product (course) development process in which reduce time to market a new course. The literature showed that Lean system is implemented through four or five stage implementation plans whereas applied in different administrative and academic processes. Lean system applications in HEIs have made course content more relevant (Hess & Benjamin, 2015; Dahlgaard & Ostergaard, 2000) and made its delivery faster. They have made a huge improvement in the knowledge intake for students, the customisation and faster speed of study (Thomas et al., 2017; Gupta et al., 2016; Isaksson et al., 2013; Doman, 2011; Emiliani, 2004a; Dahlgaard & Ostergaard, 2000). The literature review depicted that HEIs are good candidates for implementing the Lean system, which lead to remarkable waste reduction and improvements in terms of cost and quality of services. According to Pepper and Spedding (2010), as cited in Sunder (2016b), organisations focused mainly on Lean tools and practices and ignored its philosophy and practical aspect to gain quality excellence. The Lean system in HEIs empowers employees to identify non-value adding (NVA) activities and to eliminate these activities for continuous improvement in operations. The Lean system ascertains opportunities to improve by identifying key NVAs, which should be focused on to change. The Lean system improves the quality of education, course content is enhanced with more relevant and advanced materials, time is saved in transferring knowledge and teaching methodology

and more value is added (Gupta et al., 2016; Isaksson et al., 2013; Doman, 2011; Emiliani, 2004a). Thomas et al. (2017) stated the Lean system successful adoption can results in more tangible outcomes and easily recognisable.

Raifsnider and Kurt (2004) performed a case-study application of LSS in HEIs document management services, which simplified and streamlined document intensive processes. The processes such as enrolment (Doman, 2011), administrative-grade change process (Svensson et al., 2015), and support services in HEIs (administration, finance, procurement and IT). It is found that Lean system implementation in HEIs are initially targeted in supporting department processes of libraries, finance, administration, IT and others (Svensson et al., 2015; Doman, 2011; Raifsnider & Kurt, 2004). One of the reasons of that is due to misconception that the non-teaching activities are understood as high cost and waste area, which need to be controlled first. Secondly, it is due to focusing on cost reduction instead of aiming value maximisation (Thomas et al., 2017). Few researches (Thomas et al., 2017; Emiliani, 2005, 2004) found with Lean system application in academic and teaching processes such as curriculum design and delivery in degree program. Thomas et al. (2017) was first to develop an integrated and balanced implementation framework on course management and programme design, which analysed in a selected HEIs. These researches showed that the Lean system application in HEIs processes is focused on waste reduction, and resulted significant improvements in performance. However, it is required to implement Lean system in academic teaching process, which is core value adding process in HEIs, and discover its benefits on it.

Comm and Mathaisel (2005b) studied the Lean system essential for sustainability of higher educations and highlighted to adopt a Lean thinking model which best fit to higher education. They described the final chapters in *Lean Thinking* by Womack and Roos (1996), “What If?” in institutions of higher education. *What if* HEIs defined value, eliminated waste, map processes, and reduced flow? For an academic institution, applying the Womack Lean system at a macro level, the following statement could be mentioned:

“The institution would define its niche and be able to provide a product second to none to meet the demand of its students. Each school would develop a map of its administrative and academic processes to efficiently and cost-effectively deliver the value the student expects from his/her educational experience. Technology would provide a valuable transport mechanism to the flow of information. Processes would be streamlined and waste would be minimised through outsourcing functions that are not contributing to the core mission of the college. Imagine a collaborative, higher education environment where duplicate functions do not exist but have shared resources with other institutions” (Comm & Mathaisel, 2005b).

The institutions are finding different ways to be competitive and sustain good quality education and services. The Lean system is found as the best fit for higher education through opening the ways to sustain it with improved services and at same time lower costs. El-Sayed et al. (2011) posits that the government initially funds public HEIs and the student is one the recipient of educational tuition service and then employed in industries. The increasing cost of tuition fees is a concern of two important stakeholders the student as a consumer and higher education as a supplier. It is necessary to focus on initiatives, which can reduce cost (Comm & Mathaisel, 2005a).

The literature showed studies proposing a methodology to integrate Lean and sustainability in HEIs (Comm & Mathaisel, 2005a, 2005b). Sunder and Antony (2018) proposed the conceptual framework of LSS in HEIs and recommended testing the proposed framework. Thomas et al. (2017) proposed the LSS Framework (LSSF), which was applied in the curriculum and program development. It was reported in a case study with full implementation of the LSSF in a HEI.

The above literature provides evidence of Lean system applications in different HEIs. The pertinent literature review published in peer-reviewed journals about the Lean system in HEIs is summarised below and shown in Table 2-3.

Table 2-3 Various Literature Evidences of the Lean system in HEIs

S.no	Reference	Type of paper	Methodology	Data collection methodology	Data Country	No. of Institut	Research Limitations/ Implications	Contribution
1	**(Emiliani, 2005)**	Research paper	Kaizen process was used for ten courses in business school degree program.	not possible to identify			Further quantitative research required to correlate kaizen results with student satisfaction.	The first known application of kaizen in HE which presents insights, critical reflections and lessons learned.
2	**(Comm & Mathaisel, 2005a)**	Casestudy	Questionnaire and open-ended follow-up discussion.	Questionnaire	USA	**18**	A preliminary study and more universities data in USA and other countries required.	Very little research on lean and sustainability in HE.
3	**(Comm & Mathaisel, 2005b)**	Research paper Exploratory	Open-ended qualitative questionnaire	Interviews		**18**	Should include more universities in the USA, and in other countries.	Very little research on lean and sustainability in HE.
4	**(Radnor & Bucci, 2011)**	report casestudies	Using a case study. Survey and Semi-structured interviews data were used.	Survey and Semi-structured interviews	UK	**5**	Only in a few HEIs.	Case studies of five Universities are presented.
5	**(Doman, 2011)**	Case study	Students worked as a team in a seminar course, and applied Lean principles and practices	not possible to identify		**1**	The students can play vital role in the improvement of university processes.	The case study validate that students can apply the concepts while learning.
6	**(Antony et al., 2012)**	Literature review	The secondary data from literature for exploration.	Literature review			Theoretical paper, require empirical studies in a no. of HEIs	An attempt to reject the myth that LSS is applicable to manufacturing.
7	**(Balzer et al., 2015)**	General review	Literature review	Literature review			Require more formal evaluations of the recommendations	A structured, step-by-step approach for implementing Lean
8	**(Svensson et al., 2015)**	Case study	The observations of a large LSS implementation in a HEI, supported with literature.	Observation	Saudia Arabia	**1**	A guidance of LSS implementation through an empirical study and a casestudy.	Presented implementations of LSS in HE.
9	**(Thomas et al., 2015)**	Research paper	A series of focus groups, and interviews	Focus group interviews		**4**	To provide a complete map of Lean development in HEIs, it could be extended widely by a larger set of HEIs	First paper to study the organisational and cultural dynamics role in the implementation of Lean in institutes.
10	**(Hess & Benjamin, 2015)**	Conceptual paper	Literature review	Literature review			Could be use as a practical orientation to LSS in the university setting. Cultural changes are obstacles.	Due to the unique culture of HE, the LSS in university processes has been sparse.
11	**(Waterbury, 2015)**	Case study	Conducted Semi-structured interviews from the administrators.	Semi structured interviews	New Zealand	**7**	Further research required to study the role of leadership support to implement.	Original research on concurrent challenges in implementing Lean in HE.
12	**(Douglas et al., 2015)**	conceptual paper	Academic staff brainstorming, observation and focus grouped discussion.	participant observation, brainstorming, and focus grouped	UK	**6**	Only in a few HEIs based on limited number of observations.	A holistic picture about Lean thinking in both academic and administrative processess of HEIs.
13	**(Balzer et al., 2016)**	Literature review and conceptul framework	Literature review of 64 publications	Literature review of 64 publications			Combining it with change management concepts will help to define best practices with Lean.	It is first study of systematic literature review on Lean in HE.
14	**(Vijaya Sunder, 2016)**	Case study	Literature review and Case study	Not possible to identify	India	**1**	An excellent resource for researchers and HE professionals.	Illustrates LSS importance and application in HE, for imbibing quality excellence.

Source: Author

Various studies (Sunder & Antony, 2018; Balzer et al., 2016; Sunder, 2016a; Hess & Benjamin, 2015; Balzer et al., 2015; Antony et al., 2012) based on general review or

developing frameworks on the basis of the literature review. The general literature reviews helped to identify Lean system principle, practices, applications, tools, barriers, challenges, and future research in university settings. Balzer et al. (2016) was first to provide a systematic review which integrated the published literature about Lean in HEIs. Different authors reported conceptual papers to highlight and encourage others to explore the Lean system and its practices in HEIs (Sunder & Antony, 2018; Balzer et al., 2016; Douglas et al., 2015; Hess & Benjamin, 2015).

A lot of research (Thomas et al., 2017; Sunder, 2016b; Svensson et al., 2015; Waterbury, 2015; Radnor & Bucci, 2011; Doman, 2011; Comm & Mathaisel, 2005a) is based on the case studies of HEIs that have implemented the Lean system, in particular to academic or administrative processes and highlighted their experiences and benefits gained in its application. A number of researches developed frameworks of Lean system implementation in HEIs (Sunder & Antony, 2018; Thomas et al., 2017; Narayanamurthy et al., 2017) and very few researches (Thomas et al., 2017; Narayanamurthy et al., 2017) showed the application and implementation of their proposed frameworks.

Most of the research on the Lean system in HEIs has been published from different parts of the USA (Balzer et al., 2015; Waterbury, 2015; Doman, 2011; Emiliani, 2005; Comm & Mathaisel, 2005a; Comm & Mathaisel, 2005b) and UK (Sunder & Antony, 2018; Thomas et al., 2017; Douglas et al., 2015; Antony et al., 2012; Radnor & Bucci, 2011) and very little work has been reported in other parts of world.

The literature reported Lean system applications found in both the academic and the teaching process (Thomas et al., 2017; Thomas et al., 2015; Emiliani, 2005, 2004) and administrative services (Sunder, 2016b; Svensson et al., 2015; Doman, 2011). The literature review presented on different research branches of the Lean system, e.g. principles and practices (Balzer et al., 2016; Doman, 2011; Comm & Mathaisel, 2005a); waste identification and solution (Narayanamurthy et al., 2017; Douglas et al., 2015); Agile and Lean HEIs (Sindre, 2019) and an integrated approach with Lean Six Sigma LSS (Thomas et al., 2017; Hess & Benjamin, 2015; Antony et al., 2012). A few studies (Antony et al., 2012; Comm & Mathaisel, 2005b; Comm & Mathaisel, 2005a) showed that the Lean system contributed to the sustainability of HEIs.

The Lean system seems to be the philosophy to bring change and transition in organisations and it is defined as “a Lean lifestyle” (Hines & Lethbridge, 2008; Radnor and Bucci, 2007). The ‘Lean lifestyle’ results cultural change includes employees aware of Lean potential benefits, employee empowerment, involvement in improvements and decision-making (Yorkstone, 2019; Thomas et al., 2015; Radnor & Bucci, 2011). According to Byrne (2013),

the Lean system is not just part of the strategy but in fact becomes build in culture, e.g. the HEIs just not do Lean but it is like 'be Lean'. The literature showed that Lean contributes to cost reduction and the improvement of projects in HEIs (Gupta et al., 2016; Comm & Mathaisel, 2005a; Emiliani, 2004a). The literature provides evidence of different HEIs' practices related to the Lean system, which are further explored in this study.

The pertaining literature affirms Lean system adoption in HEIs; however, it is found that challenges are its customised principles and practices.

2.3.1 Ways to initiate Lean system implementation in HEIs

Usually the Lean system is initiated in organisations with waste identification, tools and techniques implementation and organisation culture change (Maciag, 2019; Radnor & Bucci, 2011). It is important to begin with clear objectives with the right people and methods to achieve contributing outcomes. The five Lean principles that provide a base for achieving a Lean system include defining value, value stream mapping, create flow, pull, and continuous improvement.

Different HEIs had different objectives with the Lean system like teamwork, empowering employees, performance improvement, customer satisfaction, process efficiency improvement, effective communication, process flexibility, and standardisation. The most common objective found was reduced resources consumption with continuous improvement and cultural change.

The commitment of top management is essential part to succeed and bring change with Lean system, and it is helpful in facing support and funding challenges (Sunder & Antony, 2018). Balzer (2010) claimed that Lean system success lies in leadership, infrastructure, and organisational structure support in its initiatives. Sheffield Hallam University case study showed that initiatives involved practical support for changes, required trainings for that and institutional cultural change for continuous improvement (Yorkstone, 2019, pp. 81). Waterbury (2015) suggested to clarify selection of project, its team formation, trainings, and better communication in order to successfully implementing Lean system in HEIs. Davidson et al. (2020) also advocated the role of leadership, communication culture and customer focus to see promising results of Lean system.

Yorkstone (2019, pp. 8) found that 56% HEIs created process capability through consultancy, 55% through consultants other than HEIs, 45% through other HEIs, 31% through hiring skilled people, 13% through other methods (online resources, reading and trainings) and small

number of HEIs who had improvement teams based on fewer number of team members involved.

In most HEIs, the Lean program was initiated with senior administrative personnel support, and then most of them adopted external consultancy from Lean experts to train their in-house people. Then middle academics and administrative staff were deployed in training which may be full time or part time (Cristina & Felicia, 2012). The initial success of the training and projects convinced the senior staff and the program then proceeded across the entire university. Initiation trainings of Lean system in HEIs required language modification, which could be understandable in HEIs common vernacular (Waterbury, 2015). The Sheffield Hallam University coined the term 'SHU-ification' in their Lean system initiation for using tools and techniques of Lean and its language amendment in terms of customised terms used which staff can understand and uses.

Most of the HEIs showed that the success shown during the initial adoption of the Lean project into administrative processes encouraged it to spread to other departments (Hadid et al., 2016; Cristina & Felicia, 2012; Doman, 2011). Further, the Lean system helped HEIs to improve their efficiency, and helped with problem solving, standardisation and the reduction of waste.

Comm and Mathaisel (2005b) concluded study with recommendations for Lean initiative implementation in HEIs through educating employees about Lean system, application of Lean's five principles by Womack, identify success metric and continuous improvement in collaborations, outsourcing and technology.

Sinha and Mishra (2013) recommended precedents for Lean system initiatives are categorising inefficiencies and small scale Lean projects, in addition look for culture of people interaction and work flow. For Lean system implementations, aware about a HEIs readiness regarding the workplace environment and leadership practices, these either support or thwart (Balzer et al., 2015). It will help HEIs to know sources of resistance.

Waterbury (2015) studied Lean system different initiation practices in number of HEIs cases studies. Waterbury (2015) found that initiation require dedicated team to oversee Lean system deployment and a submission of formal projects with defined impact of these projects. Comparative to large projects, small and medium sized projects could be implemented faster and able to see benefits earlier in the short term. The projects are supposed to align with institutional values, the scope aligned with available resources and embedded with broad based learning. If projects selected impact small number of students or faculty member then strategically prefer projects which impact is university wide. The executives and staff both form steering committee, which support and disseminate persuasive reason for Lean system

implementation ultimately dispel Lean myths. The communication required to be consistent with follow up meetings on regular basis. The leader's continuous and dedicated support is essential to add value to student, staff, and institute. The leaders role facilitate in resources allocation, coordination, communication, execution and continuity of Lean system implementation (Balzer et al., 2015). Balzer et al. (2015) posits that leaders visit workplace ("Gemba walks") and Lean expert expose wastes and poor flow while highlighting Lean terms, it could be helpful in raising awareness of Lean system. The Macquarie University case study of library process also involved Gemba walk in initiation to know process for improvements (Yorkstone, 2019, pp. 69).

Through initial short workshop, the five basic steps are demonstrated to accomplish Lean system changes in HEIs in short time by involving university employees. These five basic steps are identification of value of the processes, analysing process to eliminate wastes, applying Lean tools and techniques to rebuild process, implementation, and evaluation and lastly heading towards perfection (Balzer et al., 2015; Byrne, 2013; Balzer, 2010).

For Lean system in HEIs, it is recommended to learn the experience of HEIs who successfully implemented Lean system through assistance from their people or visit to that institute. Alumni could be effective teachers to share their experience of working with Lean system. Another source could be webinars and publication about Lean system in HEIs, but it might be less effective (Balzer et al., 2015). The advisory board of certified Lean practitioners could be involved in initiation process for guidance (Balzer et al., 2015). The supportive infrastructure lead to a Lean culture, the Lean office could look into Lean leaders hiring, training, reward policy, and promoting to sustain Lean system initiation (Balzer et al., 2015). Through leader's involvement, it is recommended that improvements in process flow, waste, and cost reduced could be visible and more convincing to continue. Ultimately, leaders understand the operational point of view in HEIs, e.g. know the process from Lean aspect (Balzer et al., 2015).

The literature showed that different HEIs adopted different ways of initiating the Lean system in their setup. Some different ways found are a project-based approach, utilisation of external consultants on improvement projects, providing initial training to internal staff and involving them, going through a programmatic approach and a top-down approach. Although, each way has its own advantages and disadvantages, and should be adopted according to the feasibility with existing system and resources of the HEIs.

Challenges in the Lean System

According to Waterbury (2015), educational institutions usually face different challenges in adopting quality improvement programs, e.g. terminology, misconcepts about improvements, financial resources, time constraints, etc.

2.3.2

Comparative to manufacturing, Lean popularity in the service sector is not so credited (Hadid et al., 2016; Comm & Mathaisel, 2005a) and service quality is not well developed (Douglas & Frendendall, 2004). Many service sector organisations already following Lean tools and principles in some aspect but yet do not call it “Lean”, whereas they unknowingly consider it Total Quality Management (TQM), as Lean and TQM share some similar concepts like focusing continuously on customer expectations, process redesign, employee empowerment and integration of product teams (Comm & Mathaisel, 2005b). Comm and Mathaisel (2005a) highlighted that the HEIs are best fit for Lean system to cope up challenges faced, and may be HEIs use Lean concepts but give it different names in terms of quality improvement.

HEIs are slow in adopting the Lean system because of finding quantifiable results of increased reporting demands and increased competition advantage for funding (Antony et al., 2012). It is assumed that Lean system adoption will increase the workforce, activities, reporting and require extra budget to run such projects. Initially, the use of Lean in higher education faced a problem of being able to agree commonly on such metrics, which measure the efficiency of institutions in terms of teaching effectiveness and student learning (Comm & Mathaisel, 2005a). The cost per student is an accepted measure of efficiency as it shows the quantitative output of the institute (Johnstone, 1997).

Mostly the senior management had misconceptions about Lean system, which led to its misapplication (Waterbury, 2015; Spear, 2004; Swank, 2003). Student being a first main customer of HEIs process better understand the ‘value’ of each process. If they learn the Lean system and innovatively apply their experience to improve higher education and university processes, then this may create a true win-win situation opportunity for HEIs and students (Doman, 2011).

According to Balzer et al. (2015), it is challenging to change culture of HEIs that is resulted from the oldest existing HEIs. For Lean implementation, the major challenge found is creating the right culture (Antony et al., 2012). Yorkstone (2019, pp. 12) also concluded three top challenges including culture of continuous improvement is lacking, leadership support and lack of people and their time resources to dedicate such activities. In some cases, the negative connotations about the Lean system are that the Lean system reduces headcount, which will

reduce number of employees (Post & Slaughter, 2000) and placed resistance in its acceptance.

Antony et al. (2012) argued that lack of communication, resources, time, and cultural resistance to continuous improvement are major challenges in implementing Lean system in HEIs. However, Snee (2010) claimed main inhibitors to Lean implementation are no culture of employee empowerment and considering their opinions in improvement projects. Thomas et al. (2015) posits challenges in deploying Lean system in HEIs including leadership vision lacking, senior managers don't know about Lean, not aware of its potential benefits in non-manufacturing organisations, senior members lack of support, cultural resistance to change and lacking operational mind sets in HEIs.

It is also found one challenge that Lean system projects involve interdisciplinary staff from different departments, and each department has different workloads and varied schedules to balance working on these projects (Waterbury, 2015). Budget limitations also prevent new hiring of staff. Waterbury (2015) emphasised on skills of teams needed which accelerate changes in HEIs and additional trainings provided to fulfil required expertise and skill development. Senior leadership plays vital role in all these facilitation in trainings and understanding of Lean system to make its flow easier. It is suggested to study readiness level in HEIs before actual deployment and initiation to cope up challenges in Lean implementation (Sunder & Antony, 2018; Svensson et al., 2015).

The number of challenges stated in literature including the clearance of customer concept in HEI, understanding and application of terms and tools from manufacturing to HEI context, designing improvements in system instead of in isolated process, lacking communication, leadership commitment, resources, roadmap and cultural support (Waterbury, 2015; Svensson et al., 2015; Antony et al., 2012). Erstwhile literature discussed different challenges of Lean system implementation in HEIs, these challenges are summarised in Table 2-4.

Table 2-4 Challenges in Lean System Implementation in HEIs

	Challenges	References
1.	Leaders vision lacking	(Yorkstone, 2019; Thomas et al., 2015)
2.	Leaders involvement and support	(Yorkstone, 2019; Balzer et al., 2015; Thomas et al., 2015; Waterbury, 2015; Francis, 2014; Albliwi et al, 2014)
3.	Lack of awareness of Lean benefits	(Thomas et al., 2015)
4.	Managers not familiar with Lean	(Thomas et al., 2015)
5.	Dedicated team, steering committee (executives and staff)	(Waterbury, 2015)
6.	Skilled facilitators	(Yorkstone, 2019; Waterbury, 2015)
7.	Submission of formal project, small to medium sized projects,	(Nadeau, 2017; Waterbury, 2015; Thirkell & Ashman, 2014)
8.	Align with institutional values and objectives	(Thomas et al., 2015; Waterbury, 2015; Antony et al., 2012)
9.	Align with institute resources	(Yorkstone, 2019; Waterbury, 2015; Radnor & Bucci, 2011)
10.	Disseminating information to aware about Lean system and discouraging misconcepts	(Yorkstone, 2019; Thomas et al., 2015; Waterbury, 2015)
11.	Resistant of staff	(Yorkstone, 2019; Nadeau, 2017; Balzer, 2010)
12.	Lacking operational mind sets in HEIs	(Thomas et al., 2015)
13.	Lack of communication	(Thomas et al., 2015; Waterbury, 2015; Antony et al., 2012; Radnor & Bucci, 2011)
14.	Time	(Yorkstone, 2019; Thomas et al., 2015; Waterbury, 2015; Antony et al., 2012)
15.	Lacking Culture of continuous improvement	(Yorkstone, 2019; Balzer et al., 2015; Thomas et al., 2015; Antony et al., 2012; Snee, 2010)
16.	Not encouraging employee empowerment and opinion	(Balzer et al., 2015; Snee, 2010)
17.	Lack of ownership	(Yorkstone, 2019)
18.	Lacking clarity and definition of problem to be solved	(Balzer, 2010; Hu et al., 2008)
19.	External environment rapid change	(Hess & Benjamin, 2015; Balzer, 2010)
20.	Customizing certain tools for HEIs process	(Cudney et al., 2018; Albliwi et al, 2014)
21.	Understanding and aware customer and value concept in HEIs	(Cudney et al., 2018; Tenali et al., 2015; Radnor & Bucci, 2011; Steinlicht et al., 2010)

Source: Author

2.4 Lean System Programme in Different HEIs

According to Antony (2014), the low number of HEIs that have adopted Lean is most probably because of their assumption that Lean implementation is possibly better for the manufacturing sector. However, the HEIs improvement could be done by using the same methods and techniques as any other industry, both the teaching and administrative process (Simons, 2013). Sunder and Antony (2018) accede that HEIs understanding is different for Lean application in comparison to manufacturing sector from where it is originated. Svensson et al. (2015) also recommended simplification and repackaging is desired for academic context. In HEIs, the Lean system implementation adopted co-facilitator model for Kaizen teams. In which one facilitator team focus on dynamics of team, and another focuses on Lean events

(Waterbury, 2015). Yorkstone (2019, pp. 13) found that success factors of HEIs are endorsement of leadership, culture of continuous improvement, staff/ customer satisfaction, people involvement, benchmarking, training, framework, strategic alignment and resources.

Indeed, Lean system could build opportunities for HEIs to improve and it indicated many wastes and inefficiencies within the existing systems (Radnor & Bucci, 2011). There are different cases of HEIs found in the literature with Lean system adoption, among which a few are briefly discussed below and provide an overview of Lean system implementation initiation in different HEIs.

2.4.1 Universiti Putra Malaysia

In 2013, University Putra Malaysia (UPM) initiated Lean system to mitigate government declines in funding and resources constraints. It also committed to bring quality excellence and innovation approach to encourage changes in work and ways of doing it. UPM adopted Lean model inspired from the St Andrews Model of Lean management implementation model (Robinson & Yorkstone, 2014). The adoption took place in 14 divisions including Registrar's Office, Deputy Vice Chancellor Office (Research and Innovation), Development and Asset Management Office, Information and Communications Development Centre, Bursar Office, Academic Division, School of Graduate Studies, Faculty Education Studies, International Centre, Student Affairs Division, Sultan Abdul Samad Library, University Colleges and Health Centres, and Internal Audit Division. It initiated with trainings on Lean system for management awareness and carried out Lean transformations in different divisions. The Lean transformation involved nine steps; identification of improvement area, planning, training, process mapping, improvement, process re-mapping, new process implementation, monitoring and standardisation (Yorkstone, 2019, pp. 145).

2.4.2 Universiti Islam Antarabangsa Malaysia

Universiti Islam Antarabangsa Malaysia (UIAM) initiated Lean Management program in 2014. It was initiated with trainings, selected projects, and team members. The training was based on value steam mapping and 30 participants attended these trainings. These 30 participants grouped into five teams. They covered core areas of mapping, value adding, non value adding and waste concepts. Further, followed these trainings with Lean tools and techniques (i.e. 5S, Kaizen, Poka Yoke, Standard Work and others). It enabled the teams to identify root causes of wastes and selecting right tool to resolve problem in their projects. The assigned projects and teams worked towards improvements of recruitment of academic staff, leave application process, research claims process, monitoring of research progress for PhD, and promotion of the academic staff. In result of Lean Management program at UIAM, the noticeable

improvements were made in each project and promoted continuous improvement culture. However, UIAM reported potential challenges of leadership commitment and employee participation (UIAM, 2018).

King Abdullah University of Science and Technology

2.4.3 King Abdullah University of Science and Technology, or KAUST, is a private university located in the country of Saudi Arabia in the continent of Asia. In KAUST, the Lean Six Sigma program was initiated in 2011 to improve their administrative and business process (Svensson et al., 2015). It provided a platform for administrative staff to know the necessary tools and methods for improving the quality of the system. Initially, administrative staff were trained free of charge with yellow belt and green belt training through the learning and development department. These trained administrative staff worked in teams and it has been estimated that around 25 percent of the administrative staff got training and worked on method and improvement of the system across the organisation. The core purpose was to streamline the supporting functions by administration, IT, finance, and procurement for their smooth and efficient deliverance in services to student, faculty member, and staff. KAUST LSS program is considered one of the largest programs in Higher Education for training staff Lean Six Sigma (LSS) and running improvement projects (Svensson et al., 2015).

2.4.4 Cardiff University

Cardiff University is a public university located in the country of Wales region of the United Kingdom in the continent of Europe. In 2006, Cardiff University initiated the Lean system as a result of discussion between the senior faculty member of the Business School and the Vice Chancellor (Radnor & Bucci, 2011). The goal was to implement the Lean system in undergraduate, postgraduate, and executive programs. Initially an industrial Lean expert led the three-year project with four full time team members and one part time. The team targeted and trained middle and senior managers to equip them with Lean skills and systems to implement in their various departments. There was a programme ran on Lean Skills for continuous improvement for leaders and around 50 managers have been trained all around

2.4.5 the university in 2010 (Radnor & Bucci, 2011). The training brought cultural change in the university, and these were designed to share and solve problems and work together for continuous improvement.

Nottingham University

The University of Nottingham is a public university located in the country of England region of the United Kingdom in the continent of Europe. In Nottingham Business School, Dean with the support of a part time team ran Lean project from the automobile industries' Lean experts.

Nottingham Business School used a “blanket approach” of training to involve every individual in the project. Dean played an important role in designing a customised training programme that would meet the requirements of the university staff. The academic, administrative, and clerical staff participated in three days of customised Lean training and reached almost 250-trained staff. It covered the Lean operating system, Lean culture and its tools and techniques to bring about change. Many found it an entirely new concept and it raised the interest of other departments (Radnor & Bucci, 2011).

University of Central Oklahoma

2.4.6 The University of Central Oklahoma is a public university located in the state of Oklahoma region of the United States. The University of Central Oklahoma turned into a Lean HEI, due to the pressure arising out of cost increases, budget reductions, employees’ dissatisfaction, traditional administrative processes, and lower productivity. Initially it was implemented in the administrative process and with its success; it was expanded to other processes. It was initiated with the training of administrative staff to understand the Lean system and its adoption. University of Central Oklahoma adopted a four-step model which started with the identification of problems and opportunities, designing solutions for identified problems, implementing the solutions and, lastly, continuous improvement. The model was found effective and successful not only for administrative processes, where it overcome some of the pressures, but it also improved service and increased student satisfaction (Cristina & Felicia, 2012).

2.4.7

University of St Andrews

The University of St Andrews is a public university located in the country of Scotland region of the United Kingdom in the continent of Europe. The university initiated Lean system training with a team of three full time staff and with an external consultancy. When it was witnessed that the team’s efforts were adding value, a team was permanently set up in 2009 to promote a culture of continuous improvement and respect for people across the university. Initially, there was consultant support for the Lean system for three months, and gradually reliance on

2.4.8 the consultant decreased so then the consultant was only involved for ten days per year. Lean training became part of the University’s standard management development training (Radnor & Bucci, 2011).

Warwick Business School

The University of Warwick is a public university located in the country of England region of the United Kingdom in the continent of Europe. The university initiated the Lean system in 2007 with the internal staff of the Business School, and the administrative staff to act as internal

facilitators. The services of external experts were also deployed to train these internal facilitator staff, and they designed a programme to apply the principles of the Lean system practiced in manufacturing to service industries. An audit of Warwick Business School highlighted the things that needed improving and through this the idea came to implement the Lean system. The factors, which were highlighted for improvement, were the necessity of increasing efficiency with reduced time, cost, and other resources while eliminating waste (Radnor & Bucci, 2011). Ultimately, the university concluded that they needed to implement the Lean system in order to achieve all those factors that had been highlighted in the audit.

University of Minnesota

2.4.9 The University of Minnesota is a public university located in the state of Minnesota region of the United States. The University of Minnesota adopted the five-step model in Lean implementation. In first step found out that no academicians in the university were interested in Lean adoption and improvement. It then provided customised training of Lean principles to all these people to work in the university with Lean. In the third step, a central improvement office was built to encourage different departments to adopt CI activities. In step four, there were scheduled demonstration events every six weeks and lastly there was spreading of Lean system applications to other departments of the university. To communicate the Lean system applications to other people in university and spread them further, the university had a consulting team, meetings, a quarterly newsletter, and an annual quality fair (Cristina & Felicia, 2012).

The brief above discussion showed that mostly HEIs initiated with training, either internally or through consultants. For example, St Andrews University, Lean training became part of development training program (Radnor & Bucci, 2011), and KAUST Lean program became largest program in HEIs (Svensson et al., 2015). Literature showed that HEIs developed step by step approach to implement Lean system, i.e., UPM Lean transformation plan based on nine steps (Yorkstone, 2019, pp. 145), and Minnesota university had five step model (Cristina & Felicia, 2012). The most prominent and common outcomes observed in all the universities' cases are cultural change and continuous improvement of the system. Cardiff University and Nottingham University implementation witnessed cultural change and problem solving (Radnor & Bucci, 2011). However, there were different challenges in implementation of Lean system in HEIs, likely UIAM found challenge of leaders and staff commitment. The few universities with a Lean system programme are briefly summarised in Table 2-5.

Table 2-5 HEIs with Lean System Programme

Sr. no.	HEIs Cases	Year	Ways to initiate	Tools and techniques deployed	People involved	Success Factors	Outcomes	References
1.	Universiti Putra Malaysia	2013	Lean system awareness and transformation trainings	St Andrews Lean management implementation model	Staff members	Trainings and awareness program	Continuous improvement and respect for people culture	(Yorkstone, 2019)
2.	Universiti Islam Antarabangsa Malaysia	2014	Lean system trainings and Projects to improve	Value Stream mapping, VA, NVA, wastes, 5S, Kaizen, Poka Yoke, and Standard work	Staff members	Projects, team working	Continuous improvement culture	(UIAM, 2018)
3.	KAUST	2011	yellow belt and green belt training in-house trainings	Six sigma	Staff members	Administrative staff train yellow and green belt	25 percent of administrative staff got training	(Svensson et al., 2015)
4.	Cardiff University	2006	in result of discussion of seniors faculty member of Business school and Vice Chancellor	RIWs, Process Mapping, Value Stream Mapping, 5Ys, Fishbone Diagrams, Visual Management Team, Information Boards.	Industrial Lean expert with four full time team and one part time	People equipped with Lean skills and system to implement	Cultural change in university, and designed to share and solve problems and work together for continuous improvement	(Nadeau, 2017; Balzer et al., 2015; Antony, 2014; Radnor & Bucci, 2011)
5.	Nottingham University UK		Dean led project. Business School Executive oversees project with budget allocation. Add on to existing job. External academic acting as consultant.	A3s Visual Management Value Stream Mapping Root Cause Analysis Fishbone Diagram	Part time team involved from automobile industries Lean experts	Academic, administrative, and clerical staff participated in three days of customised Lean trainings and almost reach up to 250-trained staff.	Design customised training programme	(Nadeau, 2017; Radnor & Bucci, 2011)

Sr. no.	HEIs Cases	Year	Ways to initiate	Tools and techniques deployed	People involved	Success Factors	Outcomes	References
6.	University of Central Oklahoma		Trainings of Administrative staff	Kaizen and Four Step Model	Administrative staff and Trainers	Administrative staff Trainings	Cultural positive change, Employees empowered, satisfied, and increased their productivity. Customer service cost savings, Purchasing flow improved. student satisfaction increased	(Cristina & Felicia, 2012)
7.	University of St Andrews	2009	Dedicated central University team leading and running the project. External consultancy involved to provide initial training and continuing coaching and mentoring	RIEs, Process Mapping, Value Stream Mapping, Nominal Grouping Technique, Six Thinking Hats, Competency Framework, Log Frame Matrix.	Three full time staff and with external consultancy	Promote culture of continuous improvement and respect for people across the university	Lean training became the part of the Universities standard management development training	(Nadeau, 2017;Balzer et al., 2015; Radnor & Bucci, 2011; Antony, 2014)
8.	Warwick University	2007	Project Steering Group oversees project with budget allocation. Add on to existing job. External organisation initially undertook RIWs and trained internal facilitators.	RIWs and Process Mapping	Internal staff of Business school, also administrative staff altogether act as internal facilitator.	Designed programme to apply the principles of Lean system	Increasing efficiency with reduced time, cost and other resources while eliminating wastes	(Nadeau, 2017; Radnor & Bucci, 2011)
9.	University of Minnesota		Office of service and continuous improvement (OSCI), which operates as an internal consulting group to enhance service, value and efficiency	Five Step Model	Lean facilitator, department head, continuous improvement (CI) coordinator	Lean user group that meets monthly on campus, quarterly newsletter, annual quality fair	Continuous improvement	(Cristina & Felicia, 2012)

Source: Author

CHAPTER 3

3 Chapter 3 Research Methodology

This chapter reveals the research approach, philosophical assumption, research method, and strategy. It is followed by the potential reasons highlighted of chosen research method and design. The next sections show the procedures of sampling, criteria, settings and data collection, analysis, ethics, reliability and validity. This chapter rationalise the research methodology.

3.1 Research Approaches

"The studious study of a subject that is intended to discover new facts or test new ideas; the activity of finding information about something that one is interested in or needs to know about"

Longman dictionary (1995).

Research is identifying the solution for the problem, which starts from getting information and ends up with the new ideas or facts as a solution. According to Cooper and Schindler (2001), as cited by Sekaran and Bougie (2009), it is the process of deep study and analysis for discovering solutions of a problem.

Researches either propose theory or validate theory, with inductive or deductive approaches, respectively. There are three types of research approaches; deduction, induction and abduction (Saunders *et al.*, 2009).

In this research, the adopted method is induction. Inherent view is that the qualitative research usually implements inductive approach, whereas quantitative research implements deductive approach (Hyde, 2000). First, the researcher conducted induction method to analyse practices of LSHEIs and LSO, and then extract theory about the LSHEIs and LSO to generalise phenomena. In the induction method, data collection was carried out to better understand what is going on and what nature of problem exists. The researcher evaluated the collected data and performed analysis to establish a theory formulation (Saunders et al., 2009).

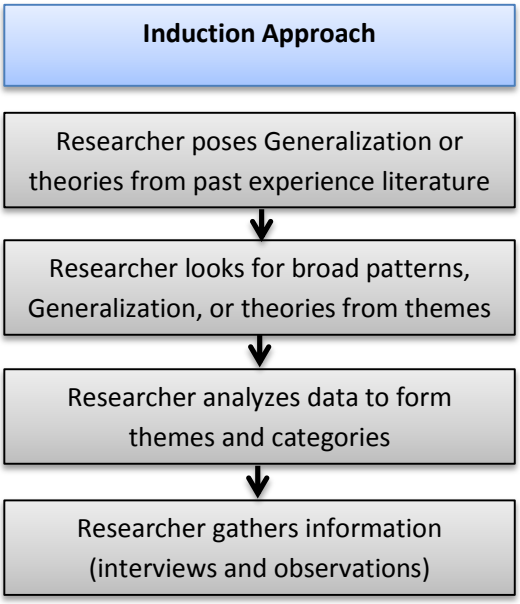

Figure 3-1 Induction Research Approach

Source: Creswell (2008)

3.2 Philosophical Assumption

Another important point of consideration in research initiation is its selection of philosophical assumption (Creswell & Clark, 2011). The literature highlights wide use of four aspects of philosophy; which are constructivism, transformative, postpositivism or either pragmatism (Creswell, 2014).

The constructivism assumption holds more relevant to qualitative research, and considered as subjective meanings of perspective and experiences of participants. Its goal is to extract meaningful knowledge from their opinions and understand phenomena (pattern of meaning) in depth to generate theory. The questions are designed general, broad, and open-ended so that participants construct the useful meaning on the phenomena settings (Creswell, 2014). However, transformative assumption holds with the study of diverse groups inequalities (e.g. race, ethnicity, gender, socioeconomic class, disability etc.), and social and political actions on these inequalities (Mertens, 2010).

According to Creswell (2014), the postpositivism assumption seems as a quantitative research approach, and considered as scientific method. In Postpositivism, the causes, which influence outcomes (effects), are determined. In other words, it empirically tests the theory, and variables are based on hypotheses and research questions, and results into accepting or refuting theory. However, Pragmatism assumptions based on situations, actions and

consequences; and rely on the approach that is most suitable to find solution of the research problem.

In this research, the researcher selected philosophical assumption of constuctivism. The qualitative data explored perspective, understanding people experiences to find meaningful information (Law & McLeod, 2004). It depicts that reality in a world is complex, continuous changing and socially constructed which reflects by the constructivism philosophical assumption. The researcher with constructivism assumption collected data in which meaningful perspective of participants lead to develop theory (qualitative).

3.3 Qualitative Research Method and Justification

There are two types of research, qualitative and quantitative. In this research, the adopted qualitative methods, aimed to provide significant empirical research about the LSHEIs practices and its outcome. According to Malina et al. (2011), the qualitative method answers the questions addressing “how” and “why”, whereas quantitative method answers the questions addressing “how many” and “how often”. First, the research design was interviews analysis. The qualitative phase was chosen to explore the LSHEIs practices and LSO.

Qualitative research is based on non-numerical data to explain phenomena, and it has depth, complexity, and richness of phenomena (Yin, 2014; Barbour, 2008; Denzin & Lincoln, 2000; Hyde, 2000; Cassell & Symon, 1994). Its findings are “grounded” in the data (Hyde, 2000). The non-numerical data collected with different methods to explain phenomena, like in depth interviews, observations, and case studies. It is ‘subjective’ or ‘Interpretivism’. Qualitative research is helpful to explore, refine, or refute theory (Keating, 1995). Qualitative research is an analytical generalizability to form theory, which is not based on frequency of phenomena, occurs in population (Hyde, 2000). In qualitative phase of this research, the researcher adopted grounded theory approach to develop theory. Grounded theory is defined as, "grounded in data systematically gathered and analysed" (Strauss & Corbin, 1994), usually use methods of interviewing, participant observation or collection of artifacts. The primary factor in grounded theory is that it continuously compares the data themes and gathers data sampling different groups in order to find most potential similarities and differences in data (Creswell, 2008). It emerged in sociology research areas and its application expanded to various other areas (Goulding, 2005).

The reasons of adopting qualitative method are enlisted below (Creswell, 2008);

1) The qualitative method is essential to understand phenomena (Malina et al., 2011). The primary purpose of this method is to explore phenomenon of the LSHEIs practices.

2) The qualitative method is appropriate to develop theory, and identification of LSHEIs practices and LSO.
3) Problems addressed by service sectors are complex, qualitative method adequate to address this complexity and find viable solution.
4) It contributed more insight from the qualitative approach and provided expanded understanding of problems. The research outcome created stronger employing qualitative method.

In this research, the researcher adopted approach in research methodology is highlighted with different criteria are shown in Table 3-1.

Table 3-1 Research Approach Criteria

S. no	Criteria	Qualitative approaches
1.	Types of research questions	Qualitative
2.	Philosophical Assumption	Constructivism
3.	Types of sampling procedures	Purposive
4.	Types of data collection procedures	Interviews
5.	Types of data	Textual and descriptive
6.	Types of data analysis	Thematic
7.	Generalizability	Analytical generalizability to form theory which is not based on frequency of phenomena occur in population
8.	Types of conclusions (‘‘objective’’ and ‘‘subjective,’’ etc.)	Emic and etic representations

Source: Author

Contemporary researches about the LSHEIs practices adopted different research methodologies and contributed theoretical and practical knowledge. For example, the literature showed data articulation through different data collection methods, as shown in Table 3-2.

Table 3-2 Evidences of Data Collection Methods or Methodologies in Researches about the LSHEIs practices

S.no	Data Collection Method or Methodology	References
1.	Qualitative	(Sunder & Antony, 2018; Balzer et al., 2016; Hess & Benjamin, 2015; Emiliani, 2005; Comm & Mathaisel, 2005b).
2.	Quantitative	(Comm & Mathaisel, 2005a)
3.	Mixed method research	(Thomas et al., 2017)
4.	Interviews	(Thomas et al., 2017; Waterbury, 2015; Radnor & Bucci, 2011; Comm & Mathaisel, 2005b)
5.	Surveys	(Thomas et al., 2017; Radnor & Bucci, 2011)
6.	Focus group discussions	(Douglas et al., 2015; Thomas et al., 2015)
7.	Observation	(Thomas et al., 2017; Svensson et al., 2015; Douglas et al., 2015)

Source: Author

In next section, the qualitative method is discussed with its data collection and analysis, sampling, research ethics, reliability and validity methods.

3.4 Research Data Collection Method

The data collection phase was an important stage to plan and precede credible research, the collected data is further analysed to extract conclusions. Data collection sources in research could be be primary or secondary sources (Creswell, 2008). Primary data sources are original data directly collected by researcher through interview, survey, experiment, observations, or ethnographic research. However, secondary data sources are indirect, and data collected from other diverse sources already collected by others for example book, journal, magazine, newspaper, or other electronic sources. In this research, both primary and secondary data collection sources are obtained.

In qualitative research, primary data was collected through conducting interviews from informants.

3.4.1 Interviews

The numerous researches in social, business and management studies are based on interviews as method of data collection (Rowley, 2012). The interviews are the most widely used research method in qualitative studies. It also helped to design instrument for further expanding study through quantitative studies (Qu & Dumay, 2011). The research interviews are based on verbal communication; either face to face between person, focus group and telephonic interviews (Rowley, 2012; Cachia & Millward, 2011). In this research, the researcher conducted interviews through both face-to-face and online method. The purpose of interview was to acquire information from the beliefs and experience of interviewee as a representative of organisation (Rowley, 2012; Qu & Dumay, 2011). Interviews allowed the researcher to see the reaction of the informants while answering the question. The interview design process was crucial and required basic information about selection of interviewee, required number of interviews and its analysis of information acquired from interviewees (Qu & Dumay, 2011), which further discussed in next sections. The researcher's interview questions were designed as semi structured. The interviews were recorded with consents and form transcriptions and notes of interview (Cachia & Millward, 2011). In interview analysis, it is more focused that what is said instead of what was frequency of same response from

number of different informants (Rowley, 2012). Various researches are based on interviews from employee and stakeholders to learn the practices of their organisation regarding the Lean system adoption (Mourtzis & Papathanasiou, 2016; Psychogios et al., 2012; Angelis et al. 2011; Comm & Mathaisel, 2005b).

Design of the semi-structured interview

3.4.2 According to Easterby-Smith et al. (1991), in-depth interview are an important source to discover research topic through interviewee's discussion and talking freely throughout the interview. The design of interview questions devised with related interview themes lead to success at the end of interview process. The designing of appropriate questions is essential element of interview success (Saunders et al., 2009). In semi-structured and in-depth interviews, the most common types of questions styles are open questions, closed (specific) questions, and probing questions. In response of open questions, respondent able to discuss an event or situation, it provides an opportunity to interviewee of extensive description in response, which helpful to explore facts and attitudes (Grummitt, 1980). Usually open questions are initiated with 'what', why' or 'how (Saunders et al., 2009, Easterby-Smith et al., 1991). Although probing question help to gather information, which is significant to the research topic. It is accompanied to explore more detailed information when interviewer unable to understand response or seek more explanation. In probing questions, the interviewee may ask more information about certain point (Saunders et al., 2009). In case if open question unable to meet the required information in response then it is acquired through supplementary questions, which probe the point of interest. According to Patton (2002), there are six types of questions that could be interviewed; (1) opinion/value questions, (2) experience/behaviour questions, (3) knowledge questions, (4) sensory questions (5) feeling questions and (6) background/demographic questions.

In this research, the open questions and probe questions were chosen to explore more details
3.5 and opinions of experiences from informants, the combination of questions referred by Patton (2002). The interview questions designed to achieve first research objective (see section 1.5).

Sampling Method and Justification

In line with the constructivism philosophical assumption, the qualitative research aimed to deeply explore phenomena. Quantitative research usually generalise sample opinion to the population on basis of random sampling. Unlikely, the qualitative research focus is on the sample, which provides in-depth knowledge of phenomena under study. Qualitative researches usually adopted non-probabilistic purposive sampling in which informants are not

chosen randomly but selected purposely to reveal their knowledge and opinion about the phenomena. The sample is identified on basis of certain purpose-based criteria defined by the researcher judgment (Creswell, 2008; Wellington & Szczerbinski, 2007).

Based on purposeful sampling (Creswell, 2008), the informants to be interviewed were first selected through snowball sampling in this research. The snowball sampling is the most commonly used purposeful sampling (Merriam, 2009). The first research question in this research (i.e., what are the LSHEIs practices in teaching processes?) led the researcher to interview main informants who had knowledge and experience regarding the LSHEIs practices. The main informants were interviewed on basis of this defined criterion, following Merriam (2009). The first main informant was the Consultant of Business Process Improvement, experienced on Lean system projects in HEIs. Subsequently, the researcher asked the early main informant to recommend next informant who are the most suitable to be interviewed. The researcher outlined guideline to the informants to refer the next informants as follows; (i) he/she affiliated in Lean system recognised HEIs (ii) he/she practitioner of Lean system in HEIs, (iii) he/she is knowledgeable in Lean system implementation in HEIs, and (iv) he/she actively involved in Lean system projects or activities in HEIs. Simply, he/she is an expert to provide rich and thick information regarding LSHEIs practices in teaching processes.

In addition to this, the interviews were also conducted in Malaysia HEI in parallel to snowball sampling of experts. In that case, the purposeful sampling is observed at site and informant level (Creswell, 2008). It means that first selected site (or institute) and then sampling of informant was applicable. At site (institute) and informant level, the critical case sampling and random sampling were selected in this research, respectively. To select sample institute, the critical case sampling was applied. Comparatively the most appropriate sampling technique found was critical case sampling, while keeping in mind the purpose of this research in qualitative phase (i.e., to identify practices of LSHEIs in teaching process). Its selection was based on its perspective of information maximum application and generalisation to other institutes (Miles & Huberman, 1994). In this research, the criteria defined for critical case sampling of institute was as following; (i) the HEI foreign campus had been following parent campus which recognised as following Lean system practices, (ii) it had the defined SOPs following parent campus (Lean recognised), (iii) it had been the oldest and recognised foreign campus in region, and (iv) it had been going through Business Process Improvement Initiatives.

Considering the defined criteria, the University of Nottingham Malaysia Campus (UNMC) was chosen as sampled case in this research for qualitative phase. The UNMC is a foreign campus of University of Nottingham UK based in Malaysia, which is well known in establishing Lean

system practices (Radnor & Bucci, 2011). Indeed the term 'Lean University' became famous after its successful implementation in pioneer universities and University of Nottingham UK is one of them (Sunder & Antony, 2018). The UNMC is one of the oldest foreign UK campuses in Malaysia and follows the SOPs and guidelines defined by University of Nottingham UK Campus. Apart from this, it is the first British university's branch campus outside the UK (UNMC, 2018). Further it is involved in continuous Business process Improvement initiatives. According to Thomas et al. (2017), it is important to collect primary data from HEIs, which are going through business improvement initiatives (whether it is TQM, Continuous Improvement, or Lean). The UNMC campus has three faculties of Science, Engineering, and Arts and Social Sciences. There are total twenty departments; five in Engineering, six in Science, and nine in Arts and Social Sciences. In UNMC, the population of academic staff is 250 and student is 5000. After selecting the sampled HEI, the random sampling technique was used at informant level. The researcher interviewed the faculty members and students at UNMC that were invited online to participate in this research. The students who had study experience of at least two years at UNMC (i.e., 3rd and 4th year students) were preferred to be interviewed.

The literature showed that there is no thumb rule to define particular number of informants to be interviewed and sites involved (Guetterman, 2015; Mason, 2010; Merriam, 2009; Lincoln & Guba, 1985). In fact, it depends on number of factors i.e., the interview questions, the gathered data and resources available for the research (Merriam, 2009). According to Mason (2010) and Lincoln and Guba (1985), the saturation is the guiding principle in selection of sample size. According to Guetterman (2015), the grounded theory is based on theoretical sampling or data saturation concept, and found that the most of the grounded theory researches based on saturation. The theoretical saturation means development of theory when research identifies main variations of phenomena and included in emerging theory. This term frequently used in researches when diffused its real meanings, and saturation is more widely used (Guest et al., 2006). Data saturation means the data is collected until no or little new information or theme observed in new responses (Guest et al., 2006; Goulding, 2005). In interviews based researches, the saturation of responses is more important than the number of interviews. Saturation depends on the number and complexity of data, researcher experience, and number of analysts (Ryan & Bernard, 2004).

According to Mason (2010), the PhD students consider large sample size in experiments or more rigorous to peer reviewers despite of understanding real concept of saturation and achieving saturation more importantly in interviews. In fact the qualitative study reflects depth and chosen sample size is representative of population either small or large number, hence homogeneity of population is considered in sample size (Boddy, 2016). The homogeneity of sample is also effective on sample size of purposive sampling in which participant chosen on

some common criteria. Mason (2010) found in study that the common sample sizes were twenty and thirty. Kuzel (1992) suggested interviewing six to eight participants in homogeneous sample is fine. Guest et al. (2006) research considered saturation supremacy in conducting interviews and found twelve interviews were optimal as a data set in non-probabilistic, purposive sampling. It is concluded that the larger sample size is not a concern of qualitative studies; in fact, the qualitative research is based on occurrence of event or phenomena instead of its frequency, which could be observed by saturation of responses.

3.6 Data Collection

The main difference of qualitative and quantitative research is vitally based on its different data. Qualitative research deals with text or words, whereas quantitative research deals with numerical values or numbers. This research collected multiple types of data (qualitative and quantitative) and from multiple sources (i.e., experts, faculty members, and students) in qualitative phases. The intensive data collection from multiple sources aimed to present comprehensive and valid evidences in this research (Yin, 2009). The researcher conducted inductive approach in the qualitative phase of research and collected primary data mainly through semi-structured interviews. The interviews helped to understand behavioural events and human affairs (Yin, 2009); similarly, the experience of informants revealed the implementation of LSHEIs practices and its outcomes. Researcher collected the original data from source of origin to formalise theory. It was time consuming, skilful and effort required, but the data collected is related and specific to research objective. The qualitative primary data from a number of informants helped to conceptualise detailed unstructured data into useful preliminary results. The qualitative face-to-face interviews were carried out between March and October, 2016. Further, on, the online interviews were carried out between March and June 2019.

The following sub sections presents the research ethics considered in data collection, the interview protocols as the guide to researcher while conducting interviews, and lastly the role of researcher.

3.6.1 Research Ethics

The Social Research Association (SRA) ethical guidelines states, “no generic formula or guidelines exist for assessing the likely benefit or risk of various types of social enquiry. Nonetheless, the social researcher has to be sensitive to the possible consequences of his or her work and should, as far as possible, guard against predictable harmful effects” (SRA, 2003; Henn et al., 2009). The researcher followed the research ethical consideration and best

practices suggested by Saunders et al. (2009); consent taken from informants, respected the informant rights to privacy, demonstrated research purpose and provided information sheet, and assured the confidentiality and use of collected data. Throughout the data collection, the researcher followed the procedures and approval of Science and Engineering Research Ethics Committee (SEREC) (Application Approval Code: MAT281215). The ethical committee reviews ensured the appropriate method followed in research and no ethical pitfall at the end of researcher. The approval subjected to the code of conduct of University of Nottingham, Malaysia Campus, where the researcher must fulfil faculty research approval requirement. The researcher started data collection after receiving approval and explained informant about research abstract and scope. Participation in this research was voluntary, that informants were at liberty to withdraw at any time without prejudice or negative consequences, that non-participation will not affect an individual's rights/access to other services/care. The informant interview was audio recorded with due permission, just to use it at analysis time. The audio record and their names kept confidential. The interviewed informant's consent form signed before initiation of data collection, information sheet and consent form attached in Appendix B.

3.6.2 Interview Protocol

For the guidance in data collection processes, the interview protocol was used in this research (Creswell, 2008). The interview protocol is mainly divided into two sections. In first section, the general information about the informant inquired; i.e. affiliation, designation in case of expert or faculty member, department and year of study in case of students. This section is important to confirm that informant is right person to be interviewed. The second section is further comprised of five sections. In order to accomplish research objective, the second section of interview protocol began with four divisions (principles of Lean categorised by Liker (2004) at four Principle Levels); (1) philosophy, (2) process, (3) people and partners, and (4) Continuous Improvement, and last division is based on Lean System Outcome (See Appendix C). Each division is based on two or more open-ended questions designed to study practices of the LSHEIs practices in teaching process and its outcomes.

3.6.3 Role of Author

Based on philosophical assumption, the researcher herself collected data from source and interacted with informants. The researcher invited informant through emailing invitation letter to participate (See Appendix D). The researcher continuously in an interpretive position throughout this research, reported and conceptualised the multiple perspectives of informants. Throughout the research process; the researcher aligned with constructivism philosophy, reported the biasness occurred and interpret data collected on each stage.

Data Analysis

3.8 According to Neuman (2014), “To analyse, we connect particular data to concepts, advance generalisations, and identify broad trends or themes.” The qualitative data is generalised by using different themes and concepts, and variables are measured to conceptualise. The adopted approach to develop codes in this research was inductive. Induction method helped to analyse LSHEIs practices and extract theory about the LSHEIs. Neuman (2014) suggested developing ‘open codes’ which are the result of first glance on transcripts and data sources recently collected. The open codes analytic notes and memos located to find themes and categorised to cluster into axial codes. In axial codes analyses causes its consequences, relation, conditions, strategies and processes. In last round, establish ‘selective coding’, which is scanning of all data and developed codes to conceptualise codes categories (Neuman, 2014). Creswell (2009) suggested eight iterative steps to analyse qualitative data including transcribing, read thorough, coding, clustering same topics, developing categories and interrelating and naming categories with alphabetise codes.

Researcher collected qualitative data in different forms of text from interviews, transcribed, coded and categorised for analysis and results. The iterative steps involved in analysis are elaborated in Figure 3-2.

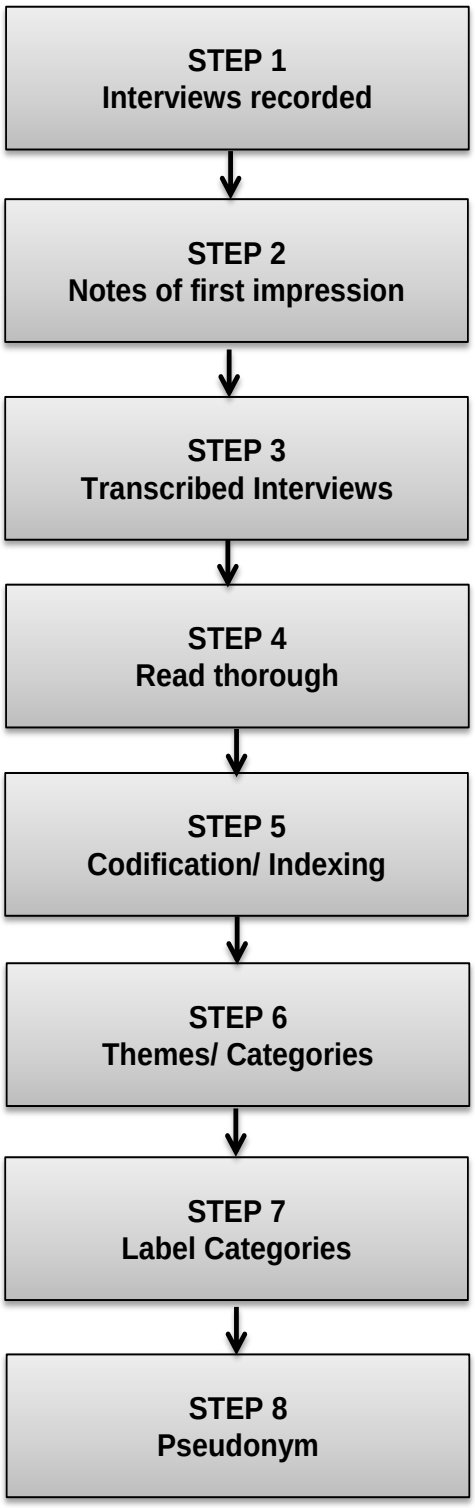

Figure 3-2 Iterative steps in Interview analysis
Source: Information from literature (Creswell, 2014; Neuman, 2014; Bryman, 2012)

In research, the informant's interviews were recorded and transcribed for analysis; however, careful notes were taken from informants interviews who avoided recordings. At time of

interview important points noted and further analysed to carefully note each point with due permission. After interview, the researcher noted informants first impression of views on each question and further verified from interviews transcribes of recorded interviews. The transcribed interviews were written word-to-word, line to line, and carefully thoroughly read in transcribes (See Appendix E). After reading thoroughly by researcher, important step of codification started.

In each interview 4th, 5th, 6th and 7th steps, mentioned above an iterative steps involved in analysis, were repeated by the researcher after transcribing. These were read thorough, codification, themes and labelling respectively. Through these steps, the themes and labels tested in each new data in every next interview. According to Saldana (2013), the coding is not simply labelling but indeed cyclic. In 6th and 7th steps of themes and labelling, data was conceptualised by the researcher, which was conceptualisation of underlined patterns, and interpreting the phenomena observed and researched. The variations exist in this process (Creswell, 2008). In addition to above seven codification steps, the Pseudonym (abbreviations) of codes were made in 8th step for analysis ease and citing in discussion instead of full brief wordings. For example, LTP1-C1 abbreviation means axial code (main categories) is first letter of Long Term Philosophy (Principle 1) and abbreviated as 'LTP1', and first open code under the LTP1 axial code is abbreviated as 'C1'.

Codification stated as label, words, phrase, lines, sentences, or sections. It includes process, actions, opinions, activities, differences, concepts, and whatever seems relevant to objectives (Creswell, 2014; Neuman, 2014; Bryman, 2012). According to Saldana (2013), "A code in qualitative inquiry is most often a word or short phrase that symbolically assigns a summative, salient, essence capturing, and/or evocative attribute for a portion of language-based or visual data." In this research, there were 94 open-ended codes identified with 132 data items. In these open ended codes, data gathered on basis of meeting following criteria (Creswell, 2014; Neuman, 2014);

a) Which was repetitive in several places by many informant,
b) Unique and new point which surprised the researcher,
c) The point explicitly stated important by the researcher,
d) Similar to the data read or expected on basis of any published report, work or common sense
e) It was relevant and addressed larger theoretical perspective or concept,
f) Or because of any other reason found relevant by the researcher.

The researcher had derived descriptive and pattern type of codes. In descriptive codes summarised the primary point of discussion, and in pattern coded on basis of patterns in the

data (Saldana, 2013). The researcher approach of codification is summative content analysis in which keywords (Lean Principles) derived from literature review and further dig out in data analysis (Hsieh & Shannon, 2005). Coding often starts by being descriptive but needs to become analytical. Different opinions found about number of codes, as Creswell (2013) suggests starts with 5-6 provisional codes, Litchtman (2010) recommends 20-100, and whereas Friese (2012) propose 120-300 codes in total. The themes or categories formed by combining related codes, with broader themes. Strauss and Cobin (1990) refer it to a 'dimensionalising'. The relationship between categories evaluated and combined into 15 categories, which are axial codes; i.e., the Lean Fourteen Principles and Lean System Outcome.

According to Malina et al. (2011), the qualitative analysis of data brings meanings to the research questions and it is subjective as human judgment on context of data. The main outputs of the qualitative research were themes of variables.

3.9 Research Reliability and Validity

Creswell (2014) suggests evaluating reliability and validity before initiating research. Reliability is minimising biases in research and ensures consistency in procedure of data collection, the word "dependability" used by Lincoln and Guba (1985) for that purpose. According to Yin (2009), the reliability means same results obtained if procedure of data collection repeated. In this research, the protocol and database were used to attain reliability. The protocols helped to follow the stability in procedure of data collection. However, the researcher developed a database, for organisation of collected data, which helped to track all required information. The data collected was documented throughout the procedure of data collection. In addition, the researcher formalised transcripts of interviews with protocols. Further, the codes were crossed checked for inter coder agreement for content analysis (Neuman, 2014).

Mays and Pope (2000) claimed that rigor qualitative research is possible by self-conscious and systemise research design, data collection, analysis and conclusion. They suggested validation methods for qualitative research are member checking and Contradictory evidence discussion. In qualitative phase, the researcher ensured the validity of research by adopting different methods, as suggested by Creswell (2008), mentioned, below;

1. Member checking
2. Rich descriptions of themes and findings
3. Self-reflection/ reflectivity of researcher opinion
4. Contradictory evidence discuss

5. Prolonged time

The interviews findings were send to informants through emails for further validation by informants for member checking. The informants acknowledged the interpretation of their interviews after concluding findings of overall qualitative research. Each code and theme was defined and explained in details to show its relation and applicability, in addition it also cleared its impacts and consequences. The prolonged time spend in data collection phase and analysis helped to ensure revealing contributing results. Researcher also added personal observations and opinions in study to share self-reflections to acknowledge validity. Further researcher did not avoid the contradictory facts during study from informants to increase richness of depth in study. All these methods combination validated the findings of qualitative results.

CHAPTER 4

Chapter 4 Qualitative Results

This chapter presents the analysis and results of the qualitative data in this onerous study. First, the qualitative research questions are briefly discussed, following with the analysis of profiles of informants involved in this research. The next section shows the results from qualitative data. Furthermore, analysis and results are presented at each Principle Level and Principles comprised in it, in which elaborated each code and its results. It is followed with the results of LSO. In next sections, results about Lean system initiation challenges and recommendations extracted from interviews are presented.

Qualitative Research Questions

In this research, the researcher adopted qualitative research to induct phenomena. The qualitative phase investigation played vital role to build theory. Preliminarily, the literature review helped to develop following theory questions for qualitative phase:

1. **Philosophy**: What are the LSHEIs practices at Philosophy Principle Level?
2. **Process**: What are the LSHEIs practices at Process Principle Level?
3. **People and Partners**: What are the LSHEIs practices at People and Partners Principle Level?
4. **Continuous Improvement**: What are the LSHEIs practices at Continuous Improvement Principle Level?
5. **Lean system Outcome**: What is the LSO of LSHEIs practices?

The qualitative research questions were developed to investigate the LSHEIs practices in teaching processes and LSO.

Profile of Informant

Based on constructivism philosophical assumption, the data collected in this research is based on multiple sources. For that purpose, the semi structured interview found the most suitable technique for data collection. The purposive sampling is utilised to find the informant in this research. The interviews were conducted until saturation met, means no new information observed from next informant. The study involved 45 informants including 16 experts, 15 faculty members, and 14 students. Details of informant are shown in Table 4-1, 4-2 and 4-3, respectively. To fulfil requirements of research ethics, the informant's names kept confidential and used Pseudonym in replacement.

Table 4-1 Expert Informants Detail

Experts	Affiliation	Designation	Interviewed	Interview duration (hr:min:sec)
E1	Heriot-Watt University, Edinburgh, UK	Consultant	online	25:46
E2	Edinburgh Napier University, UK	Consultant		51:17
E3	The University of Buckingham, UK	Professor		20:08
E4	The Management University of Africa in Nairobi, Kenya	Professor		59:21
E5	Liverpool John Moores University, UK	Senior Lecturer		26:23
E6	University of Alberta, Canada	Professor		24:35
E7	University of Queensland, Australia	Professor		57:46
E8	The University of Liverpool, UK	Lecturer		34:38
E9	Central Connecticut State University, USA	Professor		40:22
E10	Cardiff University, UK	Consultant		22:24
E11	University of St Andrews, UK	Consultant		45:10
E12	Edinburgh Napier University, UK	Consultant		43:05
E13	Cardiff University, UK	Professor		27:34
E14	Liverpool John Moores University, UK	Professor		34:45
E15	Heriot-Watt University, Edinburgh, UK	Professor		25:58
E16	University of St Andrews, UK	Consultant		31:25

Source: Author

Table 4-2 Faculty Member Informants Detail

Faculty Member	Department	Experience	Designation	Interviewed	Interview duration (hr:min:sec)
A	Engineering	Below 10 years	Assistant Professor	Face to Face	41:57
B	Engineering	Below 20 years	Associate Professor	Face to Face	45:18
C	Engineering	Below 20 years	Assistant Professor	Face to Face	25:21
D	Engineering	Below 5 years	Lecturer	Face to Face	1:02:00
E	Engineering	Below 35 years	Associate Professor	Face to Face	1:18:00
F	Business	Below 20 years	Assistant Professor	online	49:09
G	Psychology	Below 10 years	Assistant Professor	online	50:06
H	Economics	Below 10 years	Assistant Professor	online	34:33
I	Business	Below 15 years	Assistant Professor	online	43:01
J	International Relations	Below 10 years	Assistant Professor	online	43:35
K	Applied Psychology	Below 15 Years	Assistant Professor	online	48:32
L	Pharmacy	Below 10 years	Assistant Professor	online	32:56
M	Engineering	Below 10 years	Assistant Professor	online	46:54
N	Accounting	Below 10 years	Assistant Professor	online	23:37
O	Psychology	Below 10 years	Assistant Professor	online	27:01

Source: Author

Table 4-3 Student Informants Details

Student	Degree Program	Year	Department	Gender (M=Male and F=Female)	Interview	Interview duration (hr:min:sec)
S1	B.A	3	Education	M	online	21:43
S2	BSc	3	Psychology	F	Face to Face	19:21
S3	BSc	3	Bioscience	M	Face to Face	20:37
S4	BSc	4	Business	M	online	32:48
S5	BSc	3	Computers	F	online	25:17
S6	BEng	3	Environmental	F	Face to Face	20:16
S7	BA	3	International Relations	M	online	25:59
S8	BA	4	English	F	online	26:56
S9	BEng	4	Engineering	F	Face to Face	17:19
S10	BEng	4	Engineering	M	Face to Face	12:46
S11	BSc	4	Economics	M	online	25:43
S12	BSc	4	Pharmacy	M	online	31:11
S13	BSc	4	Applied Psychology	F	online	22:12
S14	BSc	4	Biomedical	F	online	29:57

Source: Author

The profiles of experts informant has shown in Table 4-1, that the experts affiliated with different HEIs were involved in this research, among them 6 were consultants and other all most of the informants were senior teaching faculty members. The expert informants were either practitioner of Lean system implementation in HEIs, or involved in Lean system projects in their HEIs, or providing consultancy regarding its adoption. The snowball sampling method ensured the right person selection for interviewing experts of LSHEIs practices.

In addition to expert's opinions, in parallel the UNMC was selected in Malaysia through critical case sampling. The faculty members and students were selected randomly as an informant in interviews. The informant's profiles shown in Table 4-2 and 4-3, that faculty members and students from different departments were participated in this research. The faculty members with experience below 20 and 10 years involved in interviews with mostly on designation of Associate and Assistant Professor. Further, it is observed that the students were all from 4th or 3rd year of their studies at UNMC. It showed that the faculty members and students both had sufficient experience to participate in this research, and share their perspective on experiencing the UNMC practices related to Lean system.

Results from Qualitative Research

The faculty members and students are the most important stakeholder of LSHEIs and directly involved in core teaching process. Qualitative research explored and studied LSHEIs practices and LSO. The LSHEIs practices are evaluated from experts, faculty members and students perspective in HEIs. The Lean experts interviews helped to learn about their perspectives and practices in LSHEIs. In addition to this, faculty members and students interviews helped to study these LSHEIs practices, particularly at UNMC. The axial codes (main themes) are Lean Principles (Liker, 2004). The open codes extracted from each interview and all unstructured information is conceptualised in this chapter. The interrelated information grouped together under same open codes.

4.3

The next section presents the results of LSHEIs practices at Principle Levels.

Lean System Higher Education Institutions Practices

4.4

This section explored LSHEIs practices particularly involved in teaching process; it is found that it is formed with different components. According to Expert E4,

"We are in era of commodities, the Degree is commodity which made up of different component, and components made up of individual modules."

Each generated code is elaborated and investigated in LSHEIs and discussed with results.

4.4.1 Philosophy

This section discussed eight codes generated at first Principle Level of Philosophy in LSHEIs practices. These codes are shown in Table 4-4.

Table 4-4 Data Conceptualisation from Qualitative Data for First Principle Level: Philosophy

S.no	Axial Codes	Themes (Open Codes)	Data Items	New Naming	Reference		
					Faculty Members	Students	Experts
1.	Principle 1: Long Term Philosophy	Outcome based	Outcome based education	LTP-C1	A, E, F, G, H, I, J, K, L, M, O	S1, S2, S3, S4, S6, S8, S11, S12, S13, S14	E1, E2, E4, E5, E7-E10, E13, E14, E15, E16
2.		Program outcome	Student aware of program outcome	LTP-C2	D, F, G, H, I, J, K, L, M, N, O	S1, S2, S3, S4, S11, S12, S13, S14	E5, E7, E8, E9, E10, E11, E12, E13, E14, E15, E16
3.		Knowledge	Providing theoretical knowledge Practical knowledge Problems and field exposure	LTP-C3	D, F, G, H, I, K, L, M, N, O	S2, S3, S4, S5, S6, S7, S8, S9, S10, S11, S12, S13, S14	E1, E2, E4, E5, E8-E11, E12, E14, E15, E16
4.		New knowledge / research	Generating the new knowledge research	LTP-C4	A, B, G, H, I, K, L, M, N, O	S1, S2, S3, S4, S5, S6, S8, S11, S12	E1, E2, E4, E5, E6, E7, E8, E10, E11, E12, E13, E14, E15, E16
5.		Soft skills	Learned by experience of university education	LTP-C5	A, B, F, G, H, I, J, K, L, M, N, O	S1, S2, S3, S4, S5, S6, S7, S8, S9, S11, S12, S13, S14	E1, E4, E5, E6, E7, E8, E10, E11, E12, E13, E14, E15, E16
6.		Soft skills learning opportunities	Soft skills learned by university experience, events, talks, clubs, societies, and others	LTP-C6	F, G, H, I, J, K, N, O	S1, S3, S4, S6, S7, S8, S14	E4, E5, E6, E7, E8, E11, E14, E16
7.			Soft skills trainings Nottingham Advantage Award (NAA) Courses		G, H, I, L, O	S2, S3, S4, S8, S11, S12, S13	
8.			More formalised trainings required on soft skills		A, H	S9	
9.		Evaluation of soft skills	Evaluation of soft skills on un formalised basis like in presentations, group work, assessments	LTP-C7	G, H, I, J, K, L, N	S4, S7, S12, S14	E7, E14
10.			Evaluation system required of students soft skills		A, H	S6	E4, E5
11.		Socio Economic Benefit	Student role in Socio Economic development	LTP-C8	G, H, K, N, O	S12	E1, E2, E4, E12, E16

12.		Provide skills required in practical life	Motivated Faculty member transfer skills required in practical life		F, G, H, I, J, K, M, O	S12, S13 , S14	E4, E13, E16

Source: Author

4.4.1.1 Principle 1: Long Term Philosophy

There are eight codes of Principle 1: Long Term Philosophy, which are generated from the experts, faculty members, and students interviews. The LSHEIs Long Term Philosophy first practice is to transfer knowledge on basis of outcome based as shown from code LTP-C1 (evidences from data E1, E2, E4, E5, E7-E10, E13, E14, E15, E16, A, E, F, G, H, I, J, K, L, M, O, S1, S2, S3, S4, S6, S8, S11, S12, S13 and S14) and evaluate it in parallel. The LSHEIs support Outcome Based Education (OBE), in which practices focus around objectives, which is value adding. Faculty member E emphasised that the UNMC focus OBE, he said that,

"Now Ministry of Higher education Malaysia prescribed OBE for HEIs, so UNMC also focused towards OBE for meeting its requirements."

The students (S1, S2, S3, S4, S6, S8, S11, S12, S13, and S14) agreed on this point that the LSHEIs having practice of providing outcome based knowledge, as discussed by faculties. Additionally, it is also found equally important that student aware of outcome, generated code LTP-C2 and evidences found from data (E5, E7, E8, E9, E10, E11, E12, E13, E14, E15, E16, D, F, G, H, I, J, K, L, M, N, O, S1, S2, S3, S4, S11, S12, S13 and S14).

For code LTP-C3, the data (E1, E2, E4, E5, E8-E11, E12, E14, E15, E16, D, F, G, H, I, K, L, M, N, O, S2, S3, S4, S5, S6, S7, S8, S9, S10, S11, S12, S13 and S14) showed that the Long Term Philosophy practice is knowledge transferring to student during their studies both theoretical and practical. That knowledge transfer is considered as main value adds. The students learn practical knowledge with field exposure. Expert E4 stated that,

"The HEIs Long Term Philosophy focus real value add in which student acquires knowledge and practical experience. They learn what desired to get job. In job they are not expected to state theory but instead of it they are supposed to be capable to apply theoretical concepts."

According to experts and faculties interviewed, teaching basic knowledge of respective field is main 'value' and process involved in it is 'value adding'. According to experts and faculties, LSHEIs require aiming to deliver basic concepts, its application, and practical problems to student. The interviewed students also supported the faculty member's responses that practical knowledge is provided and real cases discussed in modules. Student S11, while talking value add related to his field, stated that

"Value adds are theory with reality. We learn basic economic concepts and in addition real world problems to cope up with practical exposure."

For practical knowledge, students also get opportunities of external exposure of industries to further add value. The industry exposure helps them to observe practical field problems. Faculty member D talking about value adding in university process elaborated that,

"Initially student come with basic knowledge, university enhances and improves the basic knowledge and at the end of the day they are capable in the engineering or their field problems. We have different means of doing it like the tool sets mention earlier like active lectures, labs, guest lectures, trips, activities, and internships in industries to get exposure. I believe these are the cases in which we actually add 'value' in students."

Industry and research work open gates of practical and field exposure. Most of the interviewees promptly answered first about knowledge when question asked referring to Long Term Philosophy practices in LSHEIs. The interviewees responses identified also other aspects of LSHEIs practices of Long term Philosophy, like new knowledge or research, code LTP-C4 evidences found from data (E1, E2, E4, E5, E6, E7, E8, E10, E11, E12, E13, E14, E15, E16, A, B, G, H, I, K, L, M, N, O, S1, S2, S3, S4, S5, S6, S8, S11 and S12). Experts also emphasised that research is aimed in LSHEIs, as learning basic knowledge is not enough. Students also need to show interest in research, write technical papers to create new knowledge and playing more 'value' adding role in society and world.

In addition to it, experts and faculties also emphasised on requirement of soft skills learning by students to face different industrials problems and practical field. For code LTP-C5 evidences from data E1, E4, E5, E6, E7, E8, E10, E11, E12, E13, E14, E15, E16, A, B, F, G, H, I, J, K, L, M, N and O). The students (S1, S2, S3, S4, S5, S6, S7, S8, S9, S11, S12, S13, and S14) responded that LSHEIs are committed to provide opportunities of learning soft skills during their graduation, which is additional value, add. Student S1 while discussing LSHEIs philosophy aim and stated that,

"University process makes us useful resource, who equipped with both analytical and managing skills in addition to field knowledge; these soft skills are learned through university experience and activities."

In UNMC, the student not just absorb bookish knowledge but also learn soft skills, which is additional value add to compete in global market. Faculty member H shared experience that graduates learn how to network, writing email, reporting and presentation skills. Student S13 stated that,

"We learn different skills like planning, leadership, organising, and risk analysis to know sociology aspect and human behaviour in real life problem."

The students also have opportunity of learning soft skills through formal trainings like Nottingham Advantage Award (NAA) courses, evidence from data (G, H, I, L, O, S2, S3, S4, S8, S11, S12 and S13). The students' responses endorsed that the one of the strength of UNMC is supportive learning environment for soft skills, generated code LTP-C6 about learning soft skills from HEIs experience and evidences found from data (F, G, H, I, J, K, N, O, S1, S3, S4, S6, S7, S8 and S14). According to faculty member G,

"Soft skills are not embedded in courses but in fact learned by experience."

Students have miscellaneous opportunities to get exposure of different activities inside and outside the classroom to learn soft skills. Experts (E4, E5, E6, E7, E8, E11, E14, E16) also depicted that the soft skills learned by informal ways like through different events, talks, clubs, societies, and others. Faculty member I revealed that,

"We have three tools to learn soft skills in our graduates, first from Nottingham Advantage Award (NAA) courses to enhance presentation and other soft skills (at campus level), second through clubs and societies and lastly through class grouping or presentation as a part of module."

Faculty members and student (A, H, and S9) showed concern to create opportunities of more formal soft skills trainings as per requirement. Faculty member B said,

"It is not sure about any formalised trainings of soft skills, whereas students are very good in communication, presentations, and other soft skills which basically learned through university experience and well presented."

Interviewees data (E4, E5, A, H and S6) highlighted the requirement of evaluation of the soft skills in formalised way because student requires different soft skills in practical and professional experience. Expert E4 and E5 concerned about lacking of evaluation of soft skills, either it done at individual level or in in formalised ways but rarely assessed. The neglecting its importance is likely to neglect theoretical knowledge in LSHEIs, and it is required to be taken seriously to evaluate soft skills. Faculty member A suggested formalising some trainings and workshops for learning of different skills and methods to evaluate the learned soft skills during university experience. Faculty member A said,

"It is suggested to have more formalised trainings to learn and improve soft skills as an important additional value add, e.g. how people work in team when they employed in

company, how they communicate ideas in meeting with clients, etc. I don't think these kinds of skills are so readily communicated and learned on basis of only university experiences."

The code LTP-C7 generated about evaluation of soft skills in which evidence found for informal evaluation of soft skills in presentations, group work or assessments (E7, E14, G, H, I, J, K, L, N, S4, S7, S12 and S14). The code LTP-C8 emerged from data (E1, E2, E4, E12, E16, G, H, K, N, O and S12) and showed that LSHEIs Long Term Philosophy also consider socio economic role of their graduates. The responses (E4, E13, E16, F, G, H, I, J, K, M, O, S12, S13 and S14) also highlighted the motivated faculty member role in successful transfer of skills for practical life, who own and proudly work in socio economic development.

Hence, the results showed that there are different opinions found about LSHEIs practices of Principle 1: Long Term Philosophy at Philosophy level. These practices are not bound just to aiming and delivering basic theoretical knowledge but instead of it expands toward different dimensions i.e. practical, research, soft skills, socio economic development and outcome based education. The most common practices in responses are delivering theoretical and practical knowledge, research, soft skills, outcome based education and all together to become well equipped with different skills required in practical life. All together, these practices groom graduate to get desired career and expertise. These practices compiled into eight codes at Philosophy Principle Level.

In next section, the interviews results about second Principle Level of Process are discussed in detail.

4.4.2 Process

This section discussed 40 codes generated at second level of Process in LSHEIs practices. These codes are categorised into related seven principles under second Level of Processes, as shown in Table 4-5. It revealed different practices in primary and secondary process with relevant principle in LSHEIs.

Table 4-5 Data Conceptualisation from Qualitative Data for Second Principle Level: Process

S. no	Axial Codes	Themes (Open Codes)	Data Items	New Naming	Reference		
					Faculty Members	Students	Experts
13.	Principle 2:	Appointment	Well trained lecturers who has experience in research and know teaching	CF-C1	A, B, C, F, G, H, I, J, K, L, M, O	S1, S2, S3, S4, S5, S8, S11, S12, S13, S14	E2, E5, E7, E11, E13, E16

S. no	Axial Codes	Themes (Open Codes)	Data Items	New Naming	Reference		
					Faculty Members	Students	Experts
14.			Evaluated at hiring things like qualification, publication, experience	**CF-C2**	A, B, C, F, G, H, I, J		E5, E7, E8, E9, E11
15.		Faculty member industrial experience	Many faculty member industrial experienced and industrial background of related subject	**CF-C3**		S9	E8, E11
16.			Faculty member rarely industrial experienced and not essentially required industrial experience		F, G, I, L	S12	
17.		People accessible	Human resource accessible. Everyone easily accessible in whole campus.	**CF-C4**	D, F, G, H, I, J, K, L, M, N, O	S1, S2, S4, S5, S6, S8, S11, S12, S13, S14	E2, E4, E5, E6, E7, E8, E9, E11, E12, E14, E16
18.		New methods and Techniques	Content driven in education new methods and techniques of teaching (lecturing) student receive useful information	**CF-C5**	A, F, G, H, I, J, K, L, M, N, O	S2, S3, S4, S5, S7, S6, S8, S11, S12, S13, S14	E1, E4, E5, E7, E9, E10, E11, E12, E13, E14, E15, E16
19.			Students improve through different tools usage during teaching e.g. simulation, videos, games, models assignments and reports Presentations and case studies are part of modules publications encouraged		B, D, G, H, I, J, K, L, M, N, O	S1, S2, S3, S4, S5, S6, S7, S8, S11, S12, S13, S14	E4, E5, E6, E7, E8, E9, E10, E12, E13, E14, E15, E16
20.		Classrooms	Classrooms very interactive Technology equipped IT embedded Movable chairs and tables	**CF-C6**	L	S7	E6, E8, E9, E11, E14, E15
21.		Laboratories	In laboratories, equipment, provides and more addition of equipment annually. Hands on practice One to one machine available in labs	**CF-C7**	B, C, D, L, M	S9, S12, S14	E1, E2, E5, E11,
22.		Libraries	In libraries more books and accessibility to knowledge from all over the world Online journal access	**CF-C8**	B, F, G, H, I, L, O	S1, S2, S4, S5, S6, S8, S12, S13, S14	E2, E5, E7, E8, E9, E13
23.		Software	Computer labs All required software available Design proper software many licensed software	**CF-C9**	B, C, F, H, I, J, K	S5, S11	E1, E5, E6, E7, E8, E15
24.		Maintenance	Facilities well maintained Equipment downtime less Maintenance on first preference	**CF-C10**	D, J, L, M	S4, S12, S14	E4-E7, E8, E11, E13, E14, E15, E16

S. no	Axial Codes	Themes (Open Codes)	Data Items	New Naming	Reference		
					Faculty Members	Students	Experts
25.			Lab. Equipment maintenance on regular system required		D, L, M		E5, E11
26.	**Principle 3: Use Pull**	Student Centric	Student centric approach	**UP-C1**	A, B, C, F, G, H, I, J, K, L, M, N, O	S14	E1, E5, E6, E9, E11, E12, E13, E14, E15, E16
27.		Industry needs fulfilled in Teaching	Teaching meets industry needs Focus and improve teaching capability accordingly	**UP-C2**	D, E, F, H, I, J, K, L, M, N		E2, E4, E5, E7, E9, E10, E11, E12, E13, E14, E16
28.		Course or degree switching	Students have flexibility and option of selecting different courses or switch degree if they want to change	**UP-C3**	E, G, H, J, K	S2, S7	E4, E14
29.		Industries input	Input from industry taken	**UP-C4**	A, B, C, D, E, F, G, H, I, L, M, N		E1, E4, E5, E6, E7, E8, E9, E10, E11, E13, E14, E15, E16
30.		Industry collaboration	Curriculum according to requirement of industry	**UP-C5**	B, D, F, H, I, L, M, O	S2, S3, S4, S5, S14	E1, E2, E4, E5, E6, E7-E11, E13, E14, E15, E16
31.		Content	Advance and relevant contents	**UP-C6**	L, M	S4, S5, S11, S14	E12, E13, E15, E16
32.	**Principle 4: Level Workload**	Distance (infrastructure)	Students travel less in campus to reach classroom or other facilities (easy to reach classrooms, exam rooms)	**LW-C1**	I		E4, E8, E11, E12, E13, E14, E15, E16
33.			Facilities available without long delay or queue		I, J, L, M	S11, S14	E4, E8, E9, E11, E12, E14, E15, E16
34.		Scheduling	Timetables better scheduled	**LW-C2**	J, K, L, M	S4, S5, S7, S8, S11	E4, E5, E9, E11, E12, E13, E14, E15, E16
35.			Time saving in transferring knowledge		M		E4, E9, E12, E14, E15
36.		Workload	Balanced workload	**LW-C3**	I, J, L, M		E1, E2, E4, E11, E12, E13, E14, E15, E16
37.		Courses allocation	Courses allocated by head of department Faculty member rarely consulted Course allocation on basis of faculty member field, workload and module availability	**LW-C4**	A, B, D, E, G, H, I, J, M, N		E10, E11, E13, E16
38.	**Principle**	Content repetition	No content repetition in curriculum	**ER-C1**	J, K, L, M	S4, S7, S11, S14	E1, E4, E5, E7, E9, E11,

S. no	Axial Codes	Themes (Open Codes)	Data Items	New Naming	Reference		
					Faculty Members	Students	Experts
							E13, E14, E15, E16
39.			No module repetition in different programs in same university				E4, E7
40.		Student support	Student supports services provided, like wellbeing learning centre, disability support	**ER-C2**	D, E, F, G, H, I, J, K, L, M, N	S1, S2, S3, S4, S7, S8, S11, S13	E11
41.			Teachers training on Psychological First Aid		J, K, L		
42.		Exam Supplementary	Supplementary system- Get chance to clear exam Supplementary (in case of overall percentage not meeting requirement) Student get resit in case of valid reasons	**ER-C3**	E, G, H, I, J, K, L, O	S3, S4, S6, S8, S11, S12, S14	E2, E4, E5, E6, E7-E9, E11, E14, E16
43.			Small or no repeater student		K, L, O	S1, S5, S11, S14	E4, E5, E8, E9, E11-E16
44.	**Principle 6: Standardisation**	Quality Standards	Quality standards defined and followed Quality Manuals Accessed (UK Defined)	**SD-C1**	E, F, G, H, I, J, K, L, M, N, O	S8, S11, S14	E1, E2, E5, E6, E7-E11, E12, E14, E15, E16
45.		Standard followed	The standard curriculum designed and followed Usually design for five years	**SD-C2**	B, D, E, F, G, H, I, J, K, L, M, N, O		E4-E16
46.		Defined guidelines	Clear and defined contents guideline of modules, objectives and program learning outcomes	**SD-C3**	D, F, G, H, I, J, K, L, M, N, O		E2, E5, E7, E8-E13, E15, E16
47.		Style and deliveries Defined	Teaching style and deliveries defined	**SD-C4**	C, F, G, I, L, O	S1, S2, S3, S4, S6, S8, S11, S12, S13, S14	E8
48.			Teaching style and deliveries also flexible (depend on teacher and course requirement)		G, H, I, J, K, M		E4, E5, E9, E10, E11, E14, E16
49.		Marking Scheme	Marking Scheme defined (by UK campus) (range)	**SD-C5**	F, I, J, K, L, O	S1, S4, S11, S14	E4, E7, E12, E13, E14, E15, E16
50.			Whole content is covered and marking is equally distributed on content. Marking divided in each subject and its contents	**SD-C6**	C, G, H, I, J, K, L, N, O	S1, S2, S3, S4, S5, S6, S7, S8, S11, S12	E2, E4, E5, E6, E7-E11, E12, E13, E14, E16
51.		External Marking	Exams evaluated by internal and external examiners Internal and external involvement in paper setting process	**SD-C7**	F, I, J, K	S4	E2, E4, E5, E8, E10, E11, E12, E14, E16

S. no	Axial Codes	Themes (Open Codes)	Data Items	New Naming	Reference		
					Faculty Members	Students	Experts
			Paper marked by first internal moderator, UK moderator and then external				
52.		Standard	Standardised services	**SD-C8**	J, L, M, N	S4, S5, S7, S11, S12, S14	E4, E8, E12, E13, E14, E15
53.		Professional International body	Accreditation of degree by International Professional body	**SD-C9**	B, C, E, F, G, I, J, K, O	S2, S4, S6, S7, S8, S12	E4, E5, E7, E8, E10-E16
54.		Professional Local body	Accreditation of degree by local Professional body	**SD-C10**	B,C, E, F, G, H, I, J, K, O	S2, S4, S6, S7, S8, S12	E4, E5, E7, E8, E10-E16
55.		Accreditation Duration	Degree accredited for 2-5 years Most commonly five years	**SD-C11**	C, E, G, H		E4, E7
56.	**Principle 7: Visual Management**	Visual management	Information display on soft boards like conference, events, scholarships, policies etc. University Website is clear, understandable and comprehensive	**VM-C1**	B, F, G, H, I, J, K, L, M, N, O	S1, S2, S4, S5, S7, S8, S11, S12, S13, S14	E1, E2, E4, E5, E7, E8, E9, E12, E13, E14, E15, E16
57.	**Principle 8: Technology**	Online	Online knowledge access	**TH-C1**	F, G, H, I, L, M, O	S2, S4, S8, S12	E1, E2, E4, E7, E8, E11, E14, E15, E16
58.		Online	Lectures recorded or video provided				E8, E10, E11, E13, E16
59.			Blended learning (online and face to face both)	**TH-C2**	G, H, K, L, M, N, O	S4, S5, S7, S8, S11, S12	E1, E2, E4-E7, E8, E9, E10, E11, E13, E14, E15, E16
60.		Computers and networking	Technology embedded Facilities, PC, knowledge accessible Email networking very active People easily accessible on email Online resources available on Moodle accounts	**TH-C3**	B, F, G, H, I, J, K, L, M, N, O	S1, S2, S4, S5, S7, S8, S11, S12, S13, S14	E1, E2, E4, E5, E6, E7, E8, E9, E11, E12, E13, E14, E15, E16
61.		Information Flow	Efficient flow of information Technology in flow of information	**TH-C4**	J, K, L, M, N, O	S1, S5, S8, S13	E2, E4-E7, E8, E9, E11, E12, E14, E15, E16
62.		Centralised from all campuses	Course feedback form filled by all 3 campuses faculty of course each semester	**TH-C5**	D, E, F, G, H, I, L, M, N	S14	

Source: Author

4.4.2.1 Principle 2: Create Flow

There are 10 codes of practices of Principle 2: Create Flow, which are generated from the experts, faculty members, and students interviews. The most important practices found related to creating flow in LSHEIs processes are streamlining faculty member (human resource), facilities, and teaching methodology.

The first 'create flow' practice highlighted the role of competent faculty member and their availability for teaching. Expert E2 highlighted faculty member role and stated that,

"Teacher has direct effect on academic processes flow, and it is effective if they are qualified and serving well."

For code CF-C1, the data (E2, E5, E7, E11, E13, E16, A, B, C, F, G, H, I, J, K, L, M, O, S1, S2, S3, S4, S5, S8, S11, S12, S13 and S14) revealed that appointed faculty members are well trained and competed on basis of research and teaching skills. At hiring time, faculty members are evaluated for their qualification, research, experience and teaching skills, generated code CF-C2 and evidences found from responses (E5, E7, E8, E9, E11, A, B, C, F, G, H, I and J). Expert E7 shared formal hiring process to get best human resource. It starts with the need of faculty member found in department then Human Resource (HR) advertises it, applications submitted to HR, Selection committee interview and select right candidate. Faculty member interviewed or mock lecture help to assess their skills.

The Code CF-C3 generated about industrial experience of faculty members. E8, E11, and S9 responded that many faculty members joined HEIs after industrial experience, which enhanced their understanding regarding practical applications. E8 stated that,

"Teachers are more effective who have been understand customer requirement and experienced in corporates or industries."

In contrast, the faculty members (F, G, I, L) and S12 stated that faculty members rarely industrial experienced and not essentially required industrial experience. Faculty member I said that some faculty members have industrial experience, but mostly have research based experience. It showed that this practice varies in different departments, however experts emphasised on importance of industrial experience of faculty members.

The code CF-C4 generated from data (E2, E4, E5, E6, E7, E8, E9, E11, E12, E14, E16, D, F, G, H, I, J, K, L, M, N, O, S1, S2, S4, S5, S6, S8, S11, S12, S13 and S14), which highlighted easier human resource accessibility, everyone easily accessible in whole campus.
In interviews, another practice found related to create flow in teaching process is adopting different teaching methodologies i.e. demonstration, discussion, practical, etc. For code CF-C5, the data (E1, E4, E5, E7, E9, E10, E11, E12, E13, E14, E15, E16, A, F, G, H, I, J, K, L, M, N, O, S2, S3, S4, S5, S6, S7, S8, S11, S12, S13 and S14) indicated that LSHEIs adopted content driven teaching methods, and other than traditional classroom environment, it enable students to think out of box. The faculty member A told that,

"*Student receives information through more engagement outside the traditional classroom, with new methods and techniques."*

Faculty member K while sharing own experience revealed that,

"We try our best to omit traditional methods in teaching. I prefer to teach with more practical. Like in qualitative research methods refer student to go through interview process. Further includes lecture, case studies, exercises, e-learning etc. I often arrange action research and invite people from industries. We have freedom in choosing appropriate style and deliveries to achieve objectives."

For code CF-C5, the data (E4, E5, E6, E7, E8, E9, E10, E12, E13, E14, E15, E16, B, D, G, H, I, J, K, L, M, N, O, S1, S2, S3, S4, S5, S6, S7, S8, S11, S12, S13 and S14) demonstrated that the faculty members support module with case studies, presentation, assignments, reports, publication and other. Students improve through different tools usage to increase involvement during teaching e.g. simulation, videos, games, and models. Expert E4 argued that,

"Teaching methodology also depends on subject and that's why flexible, for example philosophy lecturer tools and techniques will be different, whereas quality lecturer tools and techniques will be different."

Student S13 said that students are grouped together to work on different case studies, reports, poster, or presentations and evaluate learning and skills. Expert E16 stated that,

"All depends on making easy for students to learn, spend efforts on preparation of courses, delivery of courses, use modern tools, use latest technology and involve everybody."

Thirdly, evidences found for practice of different supporting facilities to create flow in teaching process in LSHEIs. According to Expert E2,

"Universities unable to successfully transfer knowledge function without facilities."

The code CF-C6 generated about the classrooms that are technology equipped, interactive, IT embedded and fulfil requirements of faculty members and students, evidences found from data (E6, E8, E9, E11, E14, E15, L, and S7). Expert E8 said that in LSHEIs classrooms are very interactive, tables and chairs are movable, and lectures recorded in classroom. Expert E6 said that,

"IT is growing and student can be in campus online. Classroom to be enabling technology interconnected online courses. Through IT Role, student could be physically outside the classroom through such services."

The code CF-C7 generated about the laboratories and evidences found from data (E1, E2, E5, E11, B, C, D, L, M, S9, S12 and S14) that in laboratories latest equipment provided and system of adding more equipment annually as per resources and requirement, hands on practice opportunity given to each student, and one to one machine available for working smoothly.

The code CF-C8 generated from data (E2, E5, E7, E8, E9, E13, B, F, G, H, I, L, O, S1, S2, S4, S5, S6, S8, S12, S13 and S14), showed that library resources are rich enough on campus and online accessibility to all over the world. Responses (E1, E5, E6, E7, E8, E15, B, C, F, H, I, J, K, S5 and S11) said that different advance software available in computer labs and licensed software in all labs, generated code CF-C9. Faculty member F said that,

"UNMC have advance technology and all updated licensed software installed in Labs. Our first new training lab started in Business School. Students have open channels to communicate through email and people accessible."

Student S11 informed that there are no laboratory requirements in their department like engineering one or other similar. However, they have computer labs with latest software as per requirement of modules. Faculty member I summarised all facilities role in creating flow and said that,

"Libraries are more online accessed and printing facilities provided with credit, laboratories depend on program, and we don't have labs as no need in business education. Computer lab and software upgraded annually and depends on supporting budget. It is defined to schedule student meetings 6 hours in each semester. Student can come in office at any time. On Moodle, student can contact teacher. Moodle has announcement system to easily communicate to all students. Campus is one the most multi-cultural."

The code CF-C10 highlighted that maintenance of equipment to ensure availability of it whenever required in process flow. It showed the practice of less downtime targeted, evidences found from data (E4-E7, E8, E11, E13, E14, E15, E16, D, J, L, M, S4, S12, and S14). The responses showed the classrooms and other facilities maintenance is handled on different priority base. Expert E6 said,

"Anything in classroom is efficient to create flow, as students are our priority; in other cases maintenance is not so efficient."

Faculty member J revealed that,

"In classroom support services and technology are very well organised, and supportive staff is very responsive on call for all such works in class to keep it working smooth."

The responses (E5, E11, D, L, and M) showed that equipment maintenance is performed on regular basis, and well maintained for undergraduate's smooth flow of teaching process.

The results showed that faculty members are found one of the important stakeholders in LSHEIs. Their role and services are monitored and ensured continuously, whereas department-to-department few practices found different like industrial experience, funding opportunities etc. However, commonly all departments and LSHEIs have formal hiring, evaluation and professional development practices. Further, teaching methodologies and developed facilities also play role in accomplishment and flow of teaching process. It is found that all these practices altogether facilitate the successful flow of teaching process in LSHEIs, and showed evidences of Principle 2: Create Flow.

4.4.2.2 Principle 3: Use Pull

There are six codes of Use Pull practices which are generated from the experts, faculty members and students interviews. These are based on student centric teaching, fulfilling industry needs, curriculum designed according to industry requirements, and relevant and advance curriculum as per market need.

The code UP-C1 generated from data (E1, E5, E6, E9, E11, E12, E13, E14, E15, E16, A, B, C, F, G, H, I, J, K, L, M, N, O and S14) highlighted that the LSHEIs adopt more student centric approach and prefer student needs to be fulfilled. According to Expert E1,

"In Lean system, teachers are more focused on student, their learning, and requirements."

The code UP-C2 generated from data (E2, E4, E5, E7, E9, E10, E11, E12, E13, E14, E16, D, E, F, H, I, J, K, L, M and N) showed that LSHEIs is student centric that's why focus is more

towards teaching capability of faculty member to fulfil student needs. In addition to this, see industry requirements to align teaching capability accordingly. Expert E7 stated that,

"We are research intensive university. But since last 5 year, we became more focused towards teaching to meet student expectations."

Teaching is the core value adding process in LSHEIs so it is more closely observed throughout. As per faculty member E,

"It's all about teaching so institute monitors it to improve."

Faculty member D, E and M, also highlighted that teaching capability of faculty member is more focused in their HEIs. Faculty member D said,

"Teaching is most value adding process. Our university concentrated in improving teaching capability."

The code UP-C3 showed one different aspect to meet student needs, through offering flexibility in degree to switch courses or even degree in case of student interested, evidences found from responses (E4, E14, E, G, H, J, K, S2, and S7). It showed that the students have some flexibility in choosing degree programs or courses during their studies. Like in three year degree of Mechanical Engineering, students have two choices either continues to fourth year otherwise go for job or master of two years. In four year degree, program graduates can choose to start master, which will be one year or job. Both degrees accredited from different bodies and recognised. According to faculty member E,

"Students have two options in degree programs, either three year or four year bachelor program. After finishing three years students require to do master for master's degree, so got two degrees one master and one bachelor. If students do four year then they have one degree. It is bit different that this is not called master program, this is called integrated master program."

It showed that the students are independent in their choice as per their interest and need. In this way, students have flexibility to choose any one degree option as per their need. Student S2 also stated that,

"We have two degrees both are three years. After first year, we can switch to another program but not in second year of studies. The reason is that the degree duration is same three years for both so able to switch easily."

Faculty member J argued that in undergraduate (UG) has 3 degrees in which difference of language in each of these three programs. Students have switching option but it is difficult later because of language difference in each program.

The code UP-C4 is generated that LSHEIs takes inputs from industries, the responses (E1, E4, E5, E6, E7, E8, E9, E10, E11, E13, E14, E15, E16, A, B, C, D, E, F, G, H, I, L, M and N) acknowledged it. That input is taken on different processes i.e. offering new program, curriculum design, etc. Expert E4 posited that,

"Degree programs are designed by involvement of industrialists. Industrialists involve in curriculum design. It helps to offer degree which is needed in job and applicable in market."

The Expert E7 opinion was that the LSHEIs consult industry stakeholders, but it also depends on degree or discipline too. For example, in science very regular involvement is practiced but in other disciplines may be not so regular. Faculty member I believed that,

"Industrial advisory board is important for us to evaluate our curriculum and to see how each module reflects industry need."

The another perspective found about industry needs incorporated particularly in curriculum, which generated code UP-C5 and evidences found from data (E1, E2, E4, E5, E6, E7-E11, E13, E14, E15, E16, B, D, F, H, I, L, M, O, S2, S3, S4, S5 and S14). Expert E5 said that,

"Input is taken from industry in curriculum design to know needs of industries and bring pull system in curriculum design."

While discussing about industry input, faculty members revealed that industrial board involves in reviewing curriculum. They suggest improvements in it, and their point of view considered by university administration. However, industry does not dictate university, but their opinions are considered. Faculty member H said that,

"Usually curriculum detailed outline shown to industrial board and input taken from them to ensure that curriculum is aligned with industry requirements."

Students (S2, S3, S4, S5, and S14) also found satisfied from curriculum that it fulfils industrial requirements and cover related knowledge. S1 and S8 were not sure that curriculum really designed according to the requirement of industry. Expert E8 and E10 found neutral response on taking input from industry, as told that industry involvement is not mandatory and Industrial role is not 100% but it is important to listen them. However, they were convinced on its importance but not fully satisfied on current situation. Faculty member F said that industry input is practiced on new curriculum or module by taking input from industrial advisors. While

talking about student centric practice, Faculty member G informed that curriculum revised when having reasons for making changes, e.g. minor changes done at own whereas major changes made on feedback of students when topic irrelevant or hard or some other reasons. It showed that students and industry voice both important for LSHEIs, and practices for adopting pull approach in teaching process.

Experts (E12, E13, E15, and E16) emphasised on advance and relevant course contents to ensure LSHEIs practices in curriculum, generated code UP-C6. At UNMC, faculty members and students (L, M, S4, S5, S11, and S14) responses advocated code UP-C6. It is also found that UNMC ensure advance curriculum embedded with relevant courses and contents.

The results showed that LSHEIs practices of Principle 4: Use Pull is applicable through student centric approach, concern about teaching capabilities to meet student demands, industry inputs taken, curriculum as per industry demand, and relevant and advance curriculum as per market requirements. Most responses agreed and highlighted importance of fulfilling students and industry demands for Pull system in LSHEIs.

4.4.2.3 Principle 4: Levelled Workload

Evidences for Levelled Workload practices in LSHEIs found from experts, faculty members, and students responses through four codes. These LSHEIs practices codes discussed infrastructure and facilities distance, timetables better scheduling, balancing faculty member workload and courses allocation to the faculty member for levelled workload.

The experts (E4, E8, E11, E12, E13, E14, E15, and E16) especially highlighted to consider and minimise traveling and distance of classrooms, exam rooms and other facilities. It is important to make facilities time saving and accessible for students. It generated code LW-C1 that students travel less in campus to reach classroom or other facilities and it is easy to reach classrooms or exam rooms. In addition, the responses (E4, E8, E9, E11, E12, E14, E15, E16, I, J, L, M, S11 and S14) showed that the facilities availability is without delays or long queues which saves time. Faculty member I also agree on the code LW-C1, however responses (E5, E7, S9 and S10) showed their concerns on practices of LW-C1. Expert E7 also discussed one aspect that facilities are different of main and other sub campuses, i.e. main campus is big and well set, like students from other sub campuses travel 20minute to reach main campus to avail main facilities of library, halls, and many classrooms. Expert E5 said that,

"Distance is an issue when students go class to class. In one day, goes for another lecture into another building. It's difficult in sunny day."

However, student S9 and S10 showed concern that distance should be minimise and make classrooms easier to access to balance their workload. S9 said that,

"*Exam room arrangement should be improved like student know place before coming, enter exam room before 10 minutes. Traveling distance should be minimised and scheduling should be improved*."

The code LW-C2 about class scheduling and time utilisation, the experts (E4, E5, E9, E11, E12, E13, E14, E15 and E16) has shown critical concern on better scheduling of timetables in LSHEIs for Levelled workload. The faculty members and students also satisfied from better time utilisation in timetables, evident found from data (J, K, L, M, S4, S5, S7, S8, and S11). The evidences of timesaving in transfer knowledge found from data (E4, E9, E12, E14, E15, and M). Expert E15 emphasised that,

"Not only teaching is important but it is equally important to start on time, finish on time, better scheduling, levelled workload, student attentive, respond, answer questions and it is two way."

The code LW-C3 about the faculty member balanced workload which is required to get efficient results of their efforts, found from data (E1, E2, E4, E11, E12, E13, E14, E15, E16, I, J, L and M). Expert E1 said that,

"It is productive if faculty member gets balanced time for research and teaching."

However, Faculty member K found dissatisfied in workload balancing and stressed that administrative tasks take much of faculty members time; teaching is in fact a main part of the job but because of administrative tasks it becomes over whelming. Ultimately, faculty members unable to balance load for research and it is one of the barrier. LSHEIs practices advocate the balance workload in all resources utilisation to efficiently perform all tasks.

The code LW-C4 generated about courses allocation in which levelled workload is one important factor to be considered. The results showed that courses normally allocated by head of department (HODs), faculty member rarely consulted, it is based on faculty member field, expertise, workload and module availability, evidences found from data (E10, E11, E13, E16, A, B, D, E, G, H, I, J, M and N). Mostly responses showed the common practice of courses allocation by HODs.

The interviews results showed the LSHEIs practices for Levelled workload in timetables scheduling, courses allocation to faculty member, faculty member workload balancing and

facilities distancing to access. However, the few responses showed dissatisfactory in faculty member's workload balancing and facilities accessing with minimised distance. It showed informants understand its importance and further need to efficiently utilise resources, however found some gaps in their HEIs.

4.4.2.4 Principle 5: Eliminate Rework

The study generated three codes related to Eliminate Rework practices in LSHEIs from the experts, faculty members, and students interviews. It includes course and content repetition, support services for wellbeing and less student re-sit exams requirements.

The Code ER-C1 generated from responses (E1, E4, E5, E7, E9, E11, E13, E14, E15, E16, J, K, L, M, S4, S7, S11 and S14), that highlighted that content repetition is strictly avoided in curriculum. Expert E9 stated that,

"In curriculum, Lean University must check the courses for material that is either out dated, wrong order, irrelevant, or repetitive. Taken action to eliminate such reworks"

Expert E1 said that there is no chance of repetition in curriculum, as it is crosschecked and ensured while designing and teaching. It is important to make sure that no content repetition. Expert E5 said that the department conducts module meeting to avoid content repetition in same module and faculty member discuss contents for further improvements. Faculty member J shared experience that,

"In curriculum, to avoid any reworks we ensure continuity and no repetition at UNMC."

Student S4 said that,

"Curriculum and contents are current, not old, and hard to find any repetition in any semester."

Expert E4 and E7 highlighted another point that not only content repetition avoided in each department curriculum but it is also ensured that same courses are also not repeated or duplicated at university level in different programs and departments. Expert E4 opinion is that if many repeating courses in different programs then it is actually 'fat and waste'. Expert E4 stated that,

"When we repeat same tutorial 5 times in different sections of class or same module in different programs of university then it is actually duplicating efforts.

Why not modularisation applied in HEIs like in IKEA or McDonald! That keeps ketchup, bun, salad, sauces, chicken, or other common ingredients for different burgers and then use all

with flexibility. Similarly, in HEIs, same one module taught in different programs so plan to efficiently utilise resources. Instead of different classes for different sections or programs, keep it in common one class."

Expert E7 stated that,

"We try less content repetition or duplication which makes content boring if repeated, elective courses also not overlap with covered content, and at university level tries to avoid module repetition in different programs but rarely have some incidence."

The code ER-C2 generated about student support services, i.e. counselling, mentoring, guidance and special needs support. The purpose of such support services to avoid reworks in student's efforts in case of related issues to that service. The data (E11, D, E, F, G, H, I, J, K, L, M, N, S1, S2, S3, S4, S7, S8, S11 and S13) showed that the student support centres working and helps in different matters and needs, like wellbeing learning centre at UNMC, disability support, etc. The Faculty members (J, K, and L) stated that training on Psychological First Aid is provided to faculty members to support students as per individual requirement.

The code ER-C3 about paper or course repetition in case student fails to pass in first attempt. The data (E2, E4, E5, E6, E7-E9, E11, E14, E16, E, G, H, I, J, K, L, O, S3, S4, S6, S8, S11, S12 and S14) showed that supplementary system practiced in HEIs in which student get chance to clear exam if fail in first attempt. The practice differs in different HEIs as per their policy of number of attempts and criteria to appear in these attempts, like at UNMC supplementary allowed in case of overall percentage not meeting requirement or get chance of re-sit in case of valid reason. Student S4 stated that,

"Students get second chance if not qualifying required overall percentage in each semester. In case of lower marks in module but meeting overall semester percentage requirement then promoted to next semester."

The data (E4, E5, E8, E9, E11- E16, K, L, O, S1, S5, S11 and S14) acknowledged that there are no repeater students or very few.

The results showed that the Eliminate Rework practices ensure less repeater (fail) students, course or content repetition and support services to avoid such reworks (repetition in exams). The responses also reflected the measures taken by LSHEIs to ensure practices of Eliminate Rework, such as module meeting at department level to avoid content repetition and faculty member trainings on skills required for support services centres. However, the re-sit policies found different in different LSHEIs, but all aimed to minimise or eliminate repeater students.

4.4.2.5 Principle 6: Standardisation

There are eleven codes of Standardisation practices found in LSHEIs, which are generated from the experts, faculty members and students interviews.

The data (E1, E2, E5, E6, E7-E11, E12, E14, E15, E16, E, F, G, H, I, J, K, L, M, N, O, S8, S11 and S14) generated code SD-C1 which showed that the LSHEIs become more careful to define quality standards and follow these standards. The responses showed that UNMC follow UK campus, and it has defined quality manuals to understand system requirements. Faculty member G said that,

"Our quality system uniform with UK campus and continuously developing while consult with UK campus too."

Faculty member L said that,

"UK campus highly involved in teaching process and program are supposed to be identical e.g. same contents, styles defined etc."

Faculty member I revealed that,

"Our quality manual is very comprehensive, every five years we review our strategies for quality improvements and amend it if required."

These quality manuals elaborate Standard Operating Procedures (SOPs) of each process. Quality manuals play important role for guidance and considered as road map. Faculty member E confirmed that,

"The SOPs and requirements are in detail mentioned in quality manual. Quality manuals act as a reference to fulfils requirements of teaching, cost, process, and student progress each year."

Faculty member K acknowledged that,

"All procedures mentioned in handbooks and quality manuals, with flowcharts. It is same process in whole university. We have handbook for teaching or research."

Expert E7 stated that,

"We follow accreditation standards for curriculum design, and objectives are clearly defined."

Faculty member D summarised curriculum practice at UNMC and stated that,

"In terms of curriculum we have standard curriculum system; followed in three campuses UK, China, and Malaysia. It has defined program outcomes and core values. There is slight room of modification and inputs in the standard curriculum as per the requirement of industry without effecting core values."

For code SD-C2, the data (E4-E16, B, D, E, F, G, H, I, J, K, L, M, N and O) acclaimed that the standards are followed in curriculum development and usually designed for five years in mostly HEIs. Experts stated that mostly LSHEIs follow standards in curriculum design and delivery as revised after defined timeframe. E5 told that,

"We have standardised curriculum which we revise every 5 year to continuous improve."

Similar practice found at UNMC, as faculties acknowledged that UNMC follows the principal UK campus in curriculum, methods, and assessment. Faculty members convinced that each campus actually follows the defined curriculum, which normally designed for five years. Faculty member K revealed that department develops their own curriculum and current trends are seen to make part of it. Faculty member F stated that,

"Curriculum or module is usually designed locally by faculty members and then approved by UK campus. This practice is followed especially for new module."

Faculty member I told that standards are defined for all services and follow UK campus, however make changes as per local requirement if get some feedback in review process.

Experts and Faculty members (E2, E5, E7, E8-E13, E15, E16, D, F, G, H, I, J, K, L, M, N and O) highlighted that departments are provided with clear content guideline of courses, objectives, it enables to easily grasp program learning and outcomes, that generated SD-C3. According to data, the objectives of each module are defined, faculty member meets these objectives and student well aware of course objectives and outcome. In LSHEIs, more focus on core teaching process and it is equipped with different methods and techniques of teaching which worldwide used. Expert E7 stated that focus more what student value in course. The important is to teach through all these methods and objectives to get best outcomes. The teaching activities are content driven methods to offer student better exposure. The Faculty member D revealed that,

"*There are very clear guidelines about module its objectives, and students are fully aware of program learning, methods, and outcomes, students actually clearly guided on what are the objectives of the module and the program through their lecturers. Even the lecturers are always advised to go through these objectives and make sure the key activities fulfilling*

these objectives. In exam, the questions are actually mapped to these objectives and achieve certain level of expertise in particular module."

Faculty members and students acknowledged that the teaching methodology and module requirement is followed as per UK defined standard. The code SD-C4 presented that the teaching styles and deliveries are defined, evidences found from data (E8, C, F, G, I, L, O, S1, S2, S3, S4, S6, S8, S11, S12, S13 and S14). In contrast, it is also shown in results that the teaching styles and deliveries are also flexible in some extent, evidences found from data (E4, E5, E9, E10, E11, E14, E16, G, H, I, J, K and M). It showed that department-to-department practice varies, few department emphasised defined or flexible or combination of both in teaching styles and deliveries. Faculty member G informed that teaching styles and deliveries are defined and flexible for faculty member. It is recommended that both ways effective to achieve desired objectives. Expert E9 stated that the teaching styles and deliveries are more flexible in USA comparative to UK where professors do not have freedom in that respect.

The code SD-C5 presented that marking scheme is defined and followed, in case of UNMC marking scheme is defined by UK campus, evidences found from data (E4, E7, E12, E13, E14, E15, E16, F, I, J, K, L, O, S1, S4, S11 and S14). It is found that whole content is covered and assessment or marking is equally distributed in all contents, generated code SD-C6 and evidences found from (E2, E4, E5, E6, E7-E11, E12, E13, E14, E16, C, G, H, I, J, K, L, N, O, S1, S2, S3, S4, S5, S6, S7, S8, S11 and S12). It showed that marking is divided in each subject as per defined UK system, and marks of final year project and modules are divided and defined for content, assignments, participation in group others. Student S1 said that marking of exam divided; and attendance, behaviours and others factors are accountable.

The code SD-C7 generated about defined standards of involving of externals in paper setting and paper marking, evidences shown from data (E2, E4, E5, E8, E10, E11, E12, E14, E16, F, I, J, K and S4). It indicated that exams are evaluated by internal and external examiners, both involve in paper setting process. At UNMC, paper marked by first internal moderator, then UK moderator and lastly by an external. Expert E10 acknowledged that they have defined standards of quality in examination, which achieved through external involvement in all examination processes and ensure that results are 100 % accurate. Expert E4 said,

"We double mark in exam, one by module leader, and another by external.

For example, 100 exam papers send marks to another administrator, and then administrator put marks in spreadsheet, send it back to check errors. Send spreadsheet back. Once clear then error reduced through this back and forth of exam marking. However, supplementary exams are practiced when student fails first attempt. It involves rework for academic staff in

redo of exam paper, re conducting it and then re marking. Student able to get 2-3 attempts to pass and then surely quality of education suffer that they have degree but not desired level of quality education which required in job."

Expert E8 also acknowledged that,

"Marking scheme is defined, keys provided and evaluation done by external too. After internal teacher marking, moderation is done through sending sample to external to examine."

Expert E7 contradicts opinion in external evaluation and supplementary and stated that,

"Examination evaluation all internal, marking scheme and criteria defined, and re-sits and supplementary are practiced and students get two chances. In fact it is procedural fairness, in HEIs it is NVA but necessary."

Expert E11 shared paper setting process and re-sits, and told that,

"In paper setting involves 3-4 external of other universities who are teaching some courses in other universities. We have re-sit option; students can clear in another chance. If students have valid reason then they can cancel exam and attempt in next chance."

Faculty member *F demonstrated their evaluation process in courses and projects, he told that,*

"Our paper setting process is four steps; first paper set or made, second another faculty member of same departed assigned as moderator to check, and then send to UK campus moderator to check, and lastly UK moderator improves or changes if needed. In marking also same process followed that first marked by faculty member (who taught course), then second time marked by another faculty member in same department and lastly marked by UK moderator. Same process is alike in industrial projects and it is practice of business school, perhaps not same for all other departments. UK moderator check marking standard as followed UK standards."

Same practice acknowledged by faculty member I that marking scheme is defined by UK campus and follow that defined range. Marking is evaluated at number of different levels, first by internal moderator who check for any inconsistency, then by UK moderator and lastly by an external. Faculty member J believed that,

"Moderation and external involvement make examination as a peer review process which keeps it fair and good practice."

For code SD-C8, the data (E4, E8, E12, E13, E14, E15, J, L, M, N, S4, S5, S7, S11, S12, and S14) showed that standards are also defined for secondary processes (services) other than teaching, and meet the defined standards and quality level for each service.

The code SD-C9 generated from data (E4, E5, E7, E8, E10-E16, B, C, E, F, G, I, J, K, O, S2, S4, S6, S7, S8 and S12), showed that the degree is accredited by International professional body. The data (E4, E5, E7, E8, E10- E16, B, C, E, F, G, H, I, J, K, O, S2, S4, S6, S7, S8 and S12) showed that the degree is accredited by local professional body, generated code SD-C10.

Faculty member C posited,

"Accreditation is like value stream mapping."

Expert E4 believed that,

"Accreditation bodies are another stakeholder of HEIs."

Faculty member J revealed that all Malaysian HEIs are required to accredit from Malaysian Qualification Agency (MQA). Faculty member F shared experience of their department that,

"Our degree is accredited by national MQA national body. All departments accredited from MQA at UNMC and common Quality manuals are defined. Business schools usually accreditation from different international bodies like European Quality of Life Survey *(EQLS), Association of MBAs (AMBA), and Association to Advance Collegiate Schools of Business (AACSB). Currently our department accredited from one international body AMBA and also trying to accredit from international body of AACSB within year and working on it."*

The Faculty member C and E responded that UNMC engineering degree accredited by two bodies, one local Malaysian body, and another UK body. The UK body accredited 3-year degree program, and 4-year degree program accredited by Malaysian body. According to faculty member E, usually foreign students prefer 3-year UK recognised body, as going to work worldwide and do not require Malaysian body accredited 4-year degree. This fourth year is Malaysian requirement. This is applicable to international campuses, as following parent campus accreditation process. Faculty member E added that the quality of LSHEIs improves in two ways by meeting requirements of quality manual and secondly through accreditation process. The UNMC fulfils two accreditations, one by international body from parent campus and second from Malaysian body. For example UNMC engineering degree accredited by

respective UK Engineering, body e.g. mechanical engineering from IMECHY in UK, chemical engineering from ICHEMY each under UK engineering council. In Malaysian accreditation, the program is accredited by government accreditation body, e.g. engineering program accredited from Malaysian Engineering Accreditation Council (MECC). Expert E7 shared experience that,

"Degree accredited by both local and international body. Master public health program is accredited from European body, and locally from Australian body. Usually accredited for every 2-3 years, the accreditation team takes sampling data; see graduates attribute, compliance etc."

The code SD-C11 generated from data (E4, E7, C, E, G, and H) revealed about duration of degree accreditation, which is usually five years, and in some cases it is found for 2-3 years. In UNMC, the degree approved for five years after accreditation and recognised in that time. Faculty member C added,

"Its simple five year accreditation program like last year institution got five year license and accreditation from UK. It showed that system and services are meeting international standard, evaluated for five years, and approved our program. The accreditation also considers results."

The results showed that HEIs have both local and international degree accreditation. However, international accreditation varies department to department. The duration depends on meeting accreditation standards but most commonly, it is five year. It is found that accreditation team critically examines different process and identifies gaps to improve. Expert E8 posted that,

"Accreditation process helps to reach standard, help to benchmark and direct HEIs that Where to reach!

Accreditation depends on discipline, university financial status, and customer."

The results of Principle 6: Standardisation provided rich evidences of following SOPs in primary and secondary processes both, and accreditation from local and international bodies to be recognised in standards. However, it is also found that some standardisation practices are different in different departments and LSHEIs, e.g. degree duration, different degree programs accredited with different accreditation bodies, moderation in exams or flexibility in defining teaching styles and deliveries.

4.4.2.6 Principle 7: Visual Management

In Principle 7: Visual management one code generated and it covered visual management in information dissemination and process communication.

The code VM1-C1 generated from data (E1, E2, E4, E5, E7, E8, E9, E12, E13, E14, E15, E16, B, F, G, H, I, J, K, L, M, N, O, S1, S2, S4, S5, S7, S8, S11, S12, S13 and S14) showed that visual management practices in LSHEIs. In visual management practices, it is encouraged information display on soft boards like conference, events, scholarships, policies etc. Secondly, HEIs Website is clear, understandable and comprehensive. The clear notices, information, news, maps and polices updated through different mediums as well as visually displayed in addition which helps in visual management. Faculty member G said that students have pretty good access to information online or on campus. Expert E4 related visual management with example in examination that enable students to do right first time, he said that,

"Like Poka Yoke that no chance of error!

When providing students with question paper that keeps it black and answer sheet is coloured to avoid confusion of providing them with this with visual management."

The evidences have shown that LSHEIs Practices of Principle 7: Visual Management is followed in different processes to communicate information and processes.

4.4.2.7 Principle 8: Technology

There are five codes of Technology practices found in LSHEIs, which are generated from the experts, faculty members and students interviews.

The code TH-C1 generated about the online resources used in teaching and blended learning is part of courses. The data (E1, E2, E4, E7, E8, E11, E14, E15, E16, F, G, H, I, L, M, O, S2, S4, S8 and S12) advocated online knowledge access, and experts (E8, E10, E11, E13 and E16) revealed that lectures are recorded and videos are provided for students to use technology in addition. Students can consult recording or video in case of problem in understanding or missed class.

The code TH-C2 evidenced the blended learning as part of teaching, results found from data (E1, E2, E4-E7, E8, E9, E10, E11, E13, E14, E15, E16, G, H, K, L, M, N, O, S4, S5, S7, S8, S11, and S12). The blended learning practiced through face-to-face and online teaching. Expert E7 shared that teaching embedded with blended, interactive, tutorial, and engaging lectures. Expert E2 said that,

"Learning environment role is crucial in teaching effectiveness, it is now more blended learning and connected with technology. It also depends on academic program."

The code TH-C3 generated about technology embedded facilities i.e. the computer, networking and online knowledge access, evidence found from responses of (E1, E2, E4, E5, E6, E7, E8, E9, E11, E12, E13, E14, E15, E16, B, F, G, H, I, J, K, L, M, N, O, S1, S2, S4, S5, S7, S8, S11, S12, S13 and S14). It illustrated that computer labs are equipped, IT services provided, email networking very active, people easily accessible on email, online resources available on Moodle accounts and printing facilities available to students.

The code TH-C4 generated about efficient flow of information and technology involved in flow of information dissemination, evidences found from data (E2, E4-E7, E8, E9, E11, E12, E14, E15, E16, J, K, L, M, N, O, S1, S5, S8, and S13). E2 stated that standards are defined, try right thing first and avoid long delay in it through technology use in information flow.

The code TH-C5 reflected that technology use in feedbacks practices at UNMC, these are centralised with UK campuses and filled online, shown from faculty members and students responses (D, E, F, G, H, I, L, M, N and S14).

There are forty codes generated under seven principles at Process Level of LSHEIs practice. These codes showed different practices in LSHEIs in primary and secondary process, and provided evidences of each practice with respective principle. The numbers of codes generated in each principle of Process Principle Level in LSHEIs practices are ten in Create Flow (principle 2), six in Use Pull (Principle 3), four in Levelled Workload (Principle 4), three in Eliminate Rework (Principle 5), eleven in Standardisation (Principle 6), one in Visual Management (Principle 7) and five in Technology (Principle 8). The next section will reveal the LSHEIs practices at third Principle Level of People and Partners.

4.4.3 People and Partners

The literature showed that LSHEIs practices have three principles at third Principle Level: People and Partners. The qualitative results showed 18 codes at third Principle Level in LSHEIs practices. This section elaborate information related to these principles, as shown in Table 4-6.

Table 4-6 Data Conceptualisation from Qualitative Data for Third Principle: People and Partners

S. no	Axial Codes	Themes (Open Codes)	Data Items	New Nomina	Reference		
					Faculty Members	Students	Experts
63.	**Principle 9: People Growth**	Problem Based Learning	Problem based learning	**PG-**	J, K, M,	S5, S11	E4, E5-E9, E11- E16
64.		Independent and interactive	Encourage Independent and interactive learning	**PG-**	G, H, I, J, L, M, N, O	S1-S8, S11, S12, S13	E1, E2, E4-E14, E16
65.			Lectures interactive and involvement encouraged		F, G, H, I, J, L, M, N	S1, S4, S5, S8, S11	E1, E4- E16
66.		cooperative	Connected and cooperative environment	**PG-**	F, G, H, J, K, L, M	S3, S5, S6, S12	E1, E2 E4, E10, E13, E14
67.	**Principle 10: Develop People**	Industrial trips	Industry visit student have during graduation	**DP-**	A, C, D, I, M	S9, S10	E5
68.		Internship	Internships in industry Placement teams	**DP-**	A, B, C, D, E, M	S9	E5, E7, E8, E10, E11, E13
69.		Projects	Projects in industries	**DP-**	A, B, C, D, E, M	S9, S10	E7, E8, E9, E10, E13
70.			Projects are research based Projects not essentially industrial projects		F, G, H, I, J, K, L, N	S4, S7, S11, S12	E5, E9
71.		Projects settings	Project settings Tasks and duration assigned to students depend on the industry	**DP-C4**	C, D, M		E7
72.		Internship/ Project assessment	Project or internship evaluation involves internal faculty member, external and industrial supervisor	**DP-C5**	A, C, D, E, F, G, M		E10
73.		Assessments	Assessment include industrial OR practical problems	**DP-**	D, J, K, M	S1, S14	E4, E6, E7, E8, E9, E12, E13, E14
74.		Assessments Feedback	Feedbacks on assignments	**DP-C7**	J, K, L, M, O	S5, S11, S14	E4, E6, E7, E8, E9, E11, E12, E13, E15, E16
75.	**Principle 11: Partners Growth**		Industrial board active participation Industrial board feedback on course curriculum Industrial board members arrange talks Industrial board facilitate project and internships	**PrG-C1**	A, B, C, D, E, F, H, I, M	S2, S3	E4, E7, E8, E9, E10, E11, E13, E14, E16
76.		Internships / Projects sources	Industry offers internships and projects to students through industrial board or other channels	**PrG-**	A, C, D, E, M	S2	E8, E11, E16

S. no	Axial Codes	Themes (Open Codes)	Data Items	New Naming	Reference		
					Faculty Members	Students	Experts
77.			Many internships and projects opportunities created for students through personnel linkage of faculty members voluntarily		A, C, M	S14	E7, E11
78.			Industrial internships and projects systematically university arranges for students, and students voluntarily		D, M	S1, S3, S10, S14	E11
79.		Industrial Personnel Talks	Field expert talks of external people Guest lectures from other campuses or industries	PrG-C2	C, D , E, F, H, I, J, K, L, M	S2, S4, S11, S12, S14	E5, E7, E10, E11, E13, E14, E15, E16
80.		Sponsors for research	Industrial board arrange often sponsors for some industrial projects, may be through links	PrG-C4	E, G, M		
81.		Consultancy research work	Consultancy work Collaborating with companies Industrial research	PrG-C5	A, I		E1, E7, E10, E11, E16
82.		Collaboration	Collaboration with other universities (With UK campus)	PrG-C6	B, G, F, H, I, J, K, L, M, N	S3, S4, S8, S12, S13, S14	E11
83.			External or shared resources used by students if required		D, L, M	S14	E11, E12, E16
84.			Teachers teach cross campus or get training there. Collaborate on research		A, F, G, H, I, J, L, O		E11
85.		Faculty member collaboration	Faculty member of same field or research area collaborate on modules, curriculum Independently collaborate or through research centres	PrG-C7	B, G, H, K, L, N		E5, E11, E16
86.		Standard benchmarked	Benchmark and follow the principal campus in curriculum, methods and assessment Or from other universities	PrG-C8	A, B, C, D, E, F, H, I, J, L, M, N		E8, E11, E16

Source: Author

4.4.3.1 Principle 9: People Growth

There are three codes of People Growth principle that are generated from the experts, faculty members and students interviews. These codes showed practices, which enable student thorough understanding, following philosophy and becoming leaders.

The first code PG-C1 showed that problem based learning is central focus in teaching methods and techniques, and reflects into tutorials as well as in assignments, the evidences found in data (E4, E5-E9, E11-E16, J, K, M, S5 and S11). Expert E5 said that,

"Teach students to enhance their learning with problem based learning, for example practical skills, write report, case studies, go out in the field, and learn real life experience through experiment, games, visio, comparison table and control charts."

The code PG-C2 generated about the encouragement of independent and interactive learning environment, evidences found from data (E1, E2, E4- E14, E16, G, H, I, J, L, M, N, O, S1-S8, S11, S12 and S13). Expert E1 emphasised that dynamic interaction is essential to be effective. The data (E1, E4-E16, F, G, H, I, J, L, M, N, S1, S4, S5, S8 and S11) showed that the lectures are interactive and involvement of students encouraged to make it more effective. Further, the code PG-C3 reflects the connected and cooperative environment inside and outside the classroom, evidences found from data (E1, E2, E4, E10, E13, E14, F, G, H, J, K, L, M, S3, S5, S6, and S12).

Faculty member K stated that,

"We need to know how we could engage student, and make lectures more interactive. More important to create environment in classroom that accelerates learning process."

The results showed that LSHEIs practices for the growth of first stakeholders (students) through additional efforts for making lectures more interactive, engaging, connected environment, while make content more understandable through problem based learning. The faculty members also get opportunity of learning through making their lecture more aligned with practices of this principle.

4.4.3.2 Principle 10: Develop People

The second principle of Principle Level People and Partners comprised of seven codes from interview responses, which reflected practices to make students exceptional people and team who followed LSHEIs philosophy.

The code DP-C1 showed that industry visits are arranged for students for their industry exposure for learning, evidence found from data (E5, A, C, D, I, M, S9 and S10). The code DP-C2, evidences found from data (E5, E7, E8, E10, E11, E13, A, B, C, D, E, M and S9), posited that the internships are also arranged for students to get industrial work experience during studies. Expert E10 expressed that,

"We have placement team. Best students easily get chances of placement for internships. Everyone has opportunity of placement if performing well."

Internships and industry visits depend on subject and it is optional. Faculty member C acknowledged that,

""For 4 year degree, internship is compulsory for students. In 3 year degree, it is up to them and optional.
We send them for at least 12 months for industrial training."

The code DP-C3 generated about either projects in industries or based on research. The data (E7, E8, E9, E10, E13, A, B, C, D, E, M, S9 and S10) depicted that the projects are mostly industrial based, however data (E5, E9, F, G, H, I, J, K, L, N, S4, S7, S11 and S12) showed that projects are research based, and industrial projects are not compulsion. It is found that industrial or research project depends on department and field, this practice varies from one department to another. Expert E8 stated that it is highly important to have active industry liaison, it helps students to experience industry and real world problem during studies. Faculty member K stated that the projects have credit hours and student need to qualify to go head.

The code DP-C4 generated about project setting that tasks and duration assigned to students depend on the industry, and its evidences found from data (E7, C, D, and M). The code DP-C5 showed that project or internship evaluation involves internal faculty member, industrial supervisor (SV) and external, evidences found from responses of (E10, A, C, D, E, F, G, M). Faculty member F expressed that,

"Projects are evaluated by SV, further evaluated by one person from UK campus and another from UNMC. Industrial projects are optional in Business department, these are not necessarily industry, and it is also not specific."

However, Faculty member G contradicts and said that the project are assessed by both SV and external, whereas no UK campus involvement in this process. Mostly projects are research based and rarely from industries.

The assessments include practical problems and its analysis to bring practical exposure; it generated code DP-C6 and evidences found from data (E4, E6, E7, E8, E9, E12, E13, E14, D, J, K, M, S1, and S14). The assessments evident learning level of student and showed more effective when assessed on applications of concepts. The teaching of faculty member also assessed through the assessments results. Faculty member D stated,

"Teaching assessment also made on basis of examination results. The exams are designed to evaluate that either objectives achieved and transferred desired knowledge."

Expert E8 posited that assessment practices should led more toward continuous assessment and how transform from beginning to end.

The code DP-C7 generated from data (E4, E6, E7, E8, E9, E11, E12, E13, E15, E16, J, K, L, M, O, S5, S11, and S14) and demonstrated that faculty members provide feedback to students on their assessments to carefully consider it, and for further improvement in their weak areas.

The LSHEIs practices of Develop People evident most common one are assessment practical based, feedback on assignments, internships and projects as part of studies. The few practices of Develop People are found some different in different LSHEIs, i.e. projects are industrial or research based and project evaluation internal or external. All these practices provide opportunities to students and faculty member to learn exceptionally with different processes.

4.4.3.3 Principle 11: Partners Growth

The last principle in People and Partners level is Partners Growth, which comprised of eight codes from interview responses. The codes showed that the partners growth in LSHEIs involve liaison with industries and other HEIs in different processes for two-way growth.

In Principle 11: Partners Growth, the first code PrG-C1 emerged from data (E4, E7, E8, E9, E10, E11, E13, E14, E16, A, B, C, D, E, F, H, I, M, S2 and S3). It exhibited that Industrial board participate actively, i.e. Industrial board plays role in curriculum design, arrange talks and facilitate in project and internships. Faculty member E expressed that,

"The industrial liaison is handled by Industry Advisory Board (IAB). The IAB is based on 8-10 members from the industry who work together to improve curriculum, processes, and industrial exposure. It also conducts talks and events, arrange internships and projects and provide feedback about curriculum. The industry liaison is also essential element of accreditation process so that's why it is more formalised to meet accreditation requirement."

It is found that industry involvement is help to make curriculum in-line with industry needs and their recommendations are considered for practical exposures of graduates. It is noted that in curriculum and other processes, advisory board opinions and recommendations are considered but not obligatory to implement all. Faculty member B declared that,

"The University has collaboration with industries through industrial advisory board. The board plays positive role in improving system, curriculum, methods and fulfilling industrial requirements. In fact industrial boards do not dictate universities, but their requirements and needs are considered in practices."

There are different sources of projects industrial board, faculty member, or student, generated code PrG-C2. The data (E8, E11, E16, A, C, D, E, M and S2) showed that the industry offers internships and projects to students through industrial board or other channels. The data (E7, E11, A, C, M and S14) revealed that the many internships and projects opportunities created for students through personnel linkage of faculty members i on volunteer based. The data (E11, D, M, S1, S3, S10, and S14) showed that the industrial internships and projects for students are arranged systematically by institute, and at the same time students also take their own initiative. Expert E11 agreed that career department arrange internship or projects. Faculty members voluntarily facilitate or students himself also arranges internships or projects.

The code PrG-C3 generated from data (E5, E7, E10, E11, E13, E14, E15, E16, C, D , E, F, H, I, J, K, L, M, S2, S4, S11, S12 and S14), it showed that guest lectures or field expert talks of external people are arranged from other campuses or industries. Faculty member H said that,

"In our department, we have Nottingham economic society of students, usually they organise talks and guest lectures of experts. Faculty also refer and share such links and then that society organise talks."

The response (E, G, and M) generated code PLG-C4, which stated that the industrial board arranges often sponsors for some industrial projects and through links.

The code PrG-C5 generated about getting opportunities of the consultancy work and industrial research, evidences found from data (E1, E7, E10, E11, E16, A and I). The E11 highlighted the importance of consultancy work with other companies is desired to continuous improve. Faculty member A while talking about value adding, said that,

"*It is generating a new knowledge and preparing young adults for their careers, these are main value add of institution. Universities generate the new knowledge with research contribution, even consultancy work if collaborating with companies."*

The code PrG-C6 generated from data (E11, B, G, F, H, I, J, K, L, M, N, S3, S4, S8, S12, S13 and S14) indicated that the learning is not bound to own campus, but also added collaboration with other HEIs, or in UNMC case it is promoted collaboration with UK and China campuses. This collaboration is like talks, events, competition and even teaching to benefit from external resources expertise. The inter campuses and other HEIs collaboration open door for faculty member and students to learn and share knowledge on different platforms and expand their learning experience. Such exposure adds soft skills, systems study and culture learning in

addition. Faculty members discussed different aspects of collaboration with other campuses. Faculty member B responded that the collaboration with UK and other campuses work in different ways through guest lectures or mobility of students, and further it could improve faculty member's exchange. The responses (E11, E12, E16, D, L, M and S14) showed that when in-house resources not meeting module requirement then other campus resources also utilised to improve liaison of HEIs. Students have opportunities to study some courses or semester in other campuses. In addition to this, they are provided with opportunities of using external or shared resources wherever it is necessary. The data (E11, A, F, G, H, I, J, L and O) showed that the faculty members also teach cross campus, get training there and collaborate on research.

The code PrG-C7 generated about faculty members collaboration, and data (E5, E11, E16, B, G, H, K, L and N) showed that faculty members of same field or research area collaborate on modules and curriculum, usually independently collaborate or through research centres. Faculty member B said that faculty member collaborates with each other's on modules matter and other. Faculty member K shared that,

"Collaborations are usually self-initiated, talk to colleagues, rare formal platform for such collaboration. Many groups do it individual."

It is also found that LSHEIs benchmark practices in curriculum design, benchmark either parent campus or other institutes, generated code PrG-C8 and evidences found from data (E8, E11, E16, A, B, C, D, E, F, H, I, J, L, M and N). As expert E11 stated that,

"Input taken from other university while curriculum designing."

Faculty member K demonstrated assessment practices, and informed that there is collaboration in exam paper setting and marking, internally and externally moderated. Externally it is moderated by UK moderator who selected by UK, related to the field. Marking is done at the end of semester. External moderator randomly select sample from each range of percentages, e.g. sample from 70% marks range, sample from 60% marks range, sample from 50 % marks range. If module is theoretical then 100% exam based on it, if applied module then case studies and presentation involved in assessments. Expert E2 while sharing their assessment system, expressed that,

"Examination paper process is led by team. It is team of six people from all three campuses and all together work hard. This way makes more space for teaching involvement by dividing workload, improves quality of paper, more relevant questions, examination scheduling and

peer review. We ensure distance to exam hall decreased. In result, teachers got two extra weeks of teaching."

The codes showed that the LSHEIs grow internal people in first principle, and in parallel external partner's liaison in partners Growth principle. The most common practices found in that principle are IAB role in internships and projects, expert's talks and collaboration with other institutes. However, different practices found in sources of internship and project, sponsors for projects, and formal ways of collaborations with other HEIs.

LSHEIs practices in this principle resulted that dedicated IAB part in LSHEIs, its active role in curriculum design, arranging opportunities of industry visit, internship, projects and expert talks. Students were rarely familiar with internal advisory board role, however learn and experience their arrangements of industry trips, talks, and internship kind of opportunities. Further, collaboration with other HEIs through formal and informal channels is found in research, resources utilisation, talks and benchmarking.

In LSHEIs practices, there were eighteen codes emerged at third Principle Level of People and Partners. The Principle 9: People Growth has three codes, the Principle 10: Develop People has seven codes, and Principle 11: Partners Growth has eight codes from all interview responses.

The next section presents the last Principle Level of Continuous Improvement in LSHEIs practices.

4.4.4 Continuous Improvement

The literature showed that LSHEIs practices have three principles at fourth Principle Level: Continuous Improvement. The qualitative results found 19 codes at fourth Principle Level in LSHEIs practices. This section presents information emerged in these principles, as shown in Table 4-7.

Table 4-7 Data Conceptualisation from Qualitative Data for Fourth Principle Level: Continuous Improvement

S. no	Axial Codes	Themes (Open Codes)	Data Items	New Naming	Reference		
					Faculty Members	Students	Experts
87.	**Principle 12: See Situation**	Feedback from Students	Systematic method that take feedback from students Student feedback conducted on all services Students opinion Considered	**SS-C1**	A, B, C, E, F, G, H, I, J, K, L, M, N, O	S1, S2, S3, S4, S5, S6, S8, S9, S10, S11, S12, S13, S14	E2, E4- E16
88.		Feedback questionnaire	Survey questionnaire to collect data about feedback	**SS-C2**	J, K, L, O	S8, S11	E4, E5, E6, E8, E9, E12, E13, E14
89.			Open ended questions in feedback to get specific concerns				E5, E6, E7, E8, E9, E11,
90.		Course Feedback	Evaluation of Course at the end of year	**SS-C3**	A, B, C, D, E, F, G, H, I, J, K, L, M, N, O	S1-S5, S7-S12, S14	E4-E14
91.		Teaching Feedback	Evaluation of teaching at the end of year	**SS-C4**	B, C, D, E, F, G, H, I, J, K, L, M, N, O	S1, S2, S3, S4, S5, S12, S14	E4, E5, E6, E7, E8, E9, E10, E11, E12, E13, E14
92.		Student response	Usually all students do not fill feedback forms	**SS-C5**	G, H, K,	S9, S10	E4,
93.		Feedback during semester	Feedback during semester	**SS-C6**	E, G, H, I, J, K, L, N, O	S2, S4, S5, S7, S11, S14	E5, E7
94.			LCF learning quality forum during semester to improve and take student feedback, LCF three times annually		E, G, H, I, J, K, L, O	S2, S14	
95.		Informal Feedback	Different events and gathering each year open channels to discuss problems Faculty members and students participate	**SS-C7**	B, F, I, J, L, M, O	S2, S3, S4, S11, S12, S14	E6, E8
96.		Faculty member Feedback	Faculty members informal feedback taken by HODs	**SS-C8**	B, F, G, H, I, L		E1, E8, E9
97.			Faculty member formal feedback practiced				E2, E7, E11
98.			Faculty member formal feedback should be practiced for improvement		H, L		E9
99.		Employees feedback	University/ Department that contact with graduates in employments and know experience and feedback	**SS-C9**	A, B, C, H, I, L, N	S12, S14	E11
100.		Employees feedback about graduates	University/ Department ask employer also what about our graduate they say	**SS-C10**	A, B, C, E, H, N		E7
101.		Accreditation Peer Review	Peer review of system	**SS-C11**	A, B, C, E, F, G, H, I, J, K, L, N, O		E4, E5, E6, E7- E16

S. no	Axial Codes	Themes (Open Codes)	Data Items	New Nomina	Reference		
					Faculty Members	Students	Experts
102.			In accreditation check system and curriculum		B, C, E, F, G, H, I, J, K		E4, E5, E6, E7-E11, E12, E14
103.			In accreditation, check system and facilities entirely Check program, teachers qualification, student teacher ratio, IT and services, journals		A, B, C, D, E, G, H, I, J, K, L, O		E4, E5, E6, E7, E8-E11, E12, E13, E14, E15
104.			Accreditation team interview students, teachers		E, G, H, I, J, O	S11	E4, E5, E7, E8, E9, E10, E12, E14
105.	**Principle 13: Decision by Consensus**	Feedback Effectiveness	Feedback effective	**DC-C1**	F ,G, H, I, J, K, L, M, N, O	S1, S4, S5, S9, S10, S11	E1, E4, E5, E6, E7, E8, E9, E10, E11, E12, E13, E14, E15, E16
106.		Student Concerns considered in decision making	Students complains responded and solve issues	**DC-C2**	A, B, C, G, H, I, J, K, L, M, N, O	S1, S2, S6, S8, S11, S12, S14	E1, E4, E5, E6, E7, E8, E9, E10, E11, E13, E14, E16
107.		Improvement project consensus	Teachers and Students meetings are two way communication Both involve in improvements	**DC-C3**	B, C, F, G, H, I, J, K, L, M, N	S4, S5, S7, S8, S11, S12, S14	E6, E7, E8, E9, E10, E11, E13, E15, E16
108.		Input in developing facilities	Everybody give input to buy laboratory equipment/ software annually	**DC-C4**	B, D, H, I, L, M		
109.	**Principle 14: Learning Organisation CI**	Continuous improvement	Every five year program review Services continuous improves	**LO-C1**	B, D, G, H, I, J, K, L, M, N, O	S2, S4, S6, S8, S11, S12, S13, S14	E4, E5, E7, E8, E11, E12, E14, E15, E16
110.		Professional development of Faculty member	Encourage faculty member to keep learning and continuous professional development Faculty member trainings for improving capabilities	**LO-C2**	A, B, C, D, F, G, H, I, J, K, L, M, N, O	S1, S2, S5, S11, S14	E2, E4, E5, E7- E16
111.			Conferences encouraged		A, F, G, H, I, J, K, L, O		E2, E7, E9, E11
112.			Funding for research projects		A, B, F, G, H, I, J, K, O		E7, E11, E12, E16
113.			Teaching diploma for faculty members training		D, H, I, J, K, N		
114.			Faculty members Lean system trained to familiarise operational terms				E4, E5, E9
115.		Faculty member Evaluation for CI	Evaluation main criteria is teaching capability	**LO-C3**	A, B, C, F, G, H, I, K, L, M, N		E11, E12, E14, E16
116.			Teaching Skills assessed from examination results of taught course		D, L		E12

S. no	Axial Codes	Themes (Open Codes)	Data Items	New Nomina	Reference		
					Faculty Members	Students	Experts
117.			Faculty member evaluated on teaching, research, administrative skills and impact on society		G, H, I, J, K, L, M, N		E8, E13
118.			Research Evaluation Publications record No. Of citations		F, G, H, I, J, K, L, M		E7, E8, E9, E11, E12, E14, E16
119.		Student CI	Reflect on performance Student assigned 'personal tutor' (mentor) meetings with tutor/SV annually Personal tutor recommend some trainings or other guidance on performance and problems faced	**LO-C4**	D, E, F, G, H, I, J, K, L, M	S1, S7, S9, S11, S12	E10, E13

Source: Author

4.4.4.1 Principle 12: See Situation

There are eleven codes of Principle 12: See Situation, which are generated from the experts, faculty members, and students interviews. These codes highlighted the role of feedback and accreditation practices in LSHEIs for studying the status quo of all LSHEIs practices. First, found that feedback plays important role in looking into the situation. According to the Expert E14,

"Feedback system is way of continuous improvement in learning from student feedback who is the first most important stakeholder."

In response of question about See Situation principle, the experts, faculty members, and students answered the common response that they have feedback system and generated code SS-C1. The evidences found from the data (E2, E4-E16, A, B, C, E, F, G, H, I, J, K, L, M, N, O, S1-S6, S8-S13 and S14) depicted that LSHEIs purposefully take feedback from students about their experience of different services on campus, and LSHEIs are responsive on these feedbacks. The code SS-C2 generated about the tool or type of questionnaire adopted to conduct feedbacks in LSHEIs. The responses (E4, E5, E6, E8, E9, E12, E13, E14, J, K, L, O, S8, and S11) illustrated that the feedback questionnaire is usually survey. However, the experts (E5, E6, E7, E8, E9, and E11) shared their experience of open-ended questionnaire in feedbacks to know specific concerns of students. The code SS-C3 generated about feedback of course evaluation, evidences found from data (E4-E14, A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, S1, S2, S3, S4, S5, S7, S8, S9, S10, S11, S12 and S14). Student S9 and S10 were concerned that there are some gaps in feedbacks, as usually it is taken by the end of semester from each individual student then it is hard that same batch get benefited on

its actions. The code SS-C4 generated about feedback of teaching evaluation, evidences found from data (E4, E5, E6, E7, E8, E9, E10, E11, E12, E13, E14, B, C, D, E, F, G, H, I, J, K, L, M, N, O, S1, S2, S3, S4, S5, S12 and S14). The code SS-C3 and SS-C4 are both based on annual feedback at the end of semester, which is most common in HEIs. At UNMC, Faculty members and mostly students discussed that Student Evaluation of Modules (SEM) and Student Evaluation of Teaching (SET) done annually.

The responses (E4, G, H, K, S9 and S10) were concerned that not all students fill feedback forms, generated code SS-C5. According to faculty member G, around 60-70% students give feedback response. The data (E5, E7, E, G, H, I, J, K, L, N, O, S2, S4, S5, S7, S11 and S14) showed that systematic feedback is conducted during semester, generated code SS-C6. According to S14,

"We have Learning Community Forum (LCF) meeting twice in a semester. In which, class representative discuss issues in first meeting and then in next meeting check for its improvements. LCF is open for different concerns of students."

Student S4 and S5 acknowledged that class representative from each class are chosen who convey all concerns and usually responded. At UNMC, responses (E, G, H, I, J, K, L, O, S2 and S14) revealed that during semester teacher and class representative have meeting with HODs, and discuss good and bad experiences to improve onwards. Faculty member E shared practice of during semester feedback and stated that,

"Feedback during the semester is named Learning Community Forum (LCF). There are three meetings of LCF Learning community forum each of the two semesters, in which one or two class representatives provide feedback of class on which actions are taken with in rule and regulations. For example, recently problem of hours was raised in LCF, which is resolved. It's all about teaching so we monitor it to improve. The feedbacks are considered very important and purposefully conducted during semester to improve at right time. It provides platform at department level to respond and improve at right time and actions are monitored. Then second feedback is taken annually at the end of year for the two semesters. This feedback is centralised from all campuses and it is part of annual program review in the summer. The core teaching process and issues are focused for improvement, and part of continuous Quality improvement (CQI) program."

The code SS-C7 revealed informal feedback practice through different events and gathering, evidences found from responses (E6, E8, B, F, I, J, L, M, O, S2, S3, S4, S11, S12 and S14). It provides platform to faculty members and students for open discussion about problems and

experiences. S3 said that sometimes informal feedback also taken by different channels e.g. events.

The code SS-C8 generated about faculty members feedback taken by HOD. The data (E1, E8, E9, B, F, G, H, L, and I) showed that HODs take faculty member informal feedback. However, faculty member formal feedback practice evidences found from data (E2, E7, and E11). Expert E7 shared different faculty member formal feedbacks cases and told that,

> *"Like a voice of Line manager in production, faculty member formal and systemised feedbacks conducted through annual survey, leaving university survey, survey couple of year, meetings, or workshops platform used. We have formal feedback system for faculty members and students to See Situation. At the end of semester take faculty member feedback, regularly; and during semester faculty members meetings helps to raise concerns. In student's feedback, there are three ways practiced; first questionnaire in which students evaluate course, second one is annual survey of quality of teaching, services and facilities, and lastly through specific incidence rose by students."*

The responses (E9, H, and L) recommended that the faculty member formal feedback should be practiced for improvement.

Other than feedback on teaching process, the post-graduation feedback system also found for seeing the graduates skills in job from their employer and from graduates in job about their experience. The code SS-C9 revealed that LSHEIs or their department contact with graduates in employments and take feedback from them to know their experience, evidences found from (E11, A, B, C, H, I, L, N, S12 and S14). Expert E11 informed that,

> *"Our HEIs have Destination of Leavers from Higher Education (DHLE) body, who manages taking statistical survey feedback from students after employment. After 6months of graduation, that body takes graduates data of their employment or further studies."*

S14 acknowledged that university contact graduates after six months to get employment experience feedback. The code SS-C10 indicated that LSHEIs or their department also ask employer about graduates that employer satisfied from their capabilities, evidences found from data (E7, A, B, C, E, H and N).

The results showed systemise feedback practices in LSHEIs which are also effective and streamlined to continuous improve. It is found that formal meetings and online survey

feedback, both methods are part of the LSHEIs practices to hear voice of customer (student). Students acknowledged the feedback system and its effectiveness. Expert E13 stated that,

"HEIs feedback system is continuous and active, but indeed it is reactive. HEIs need to get more proactive in it."

Another practice of See Situation is found the peer review in accreditation process. The different practices found in accreditation process and generated code SS-C11, it depicted that accreditation process is peer review process and evidences found from data (E4, E5, E6, E7-E16, A, B, C, E, F, G, H, I, J, K, L, N and O). It is found that in accreditation process all elements of education process, system, curriculum, resources, and facilities evaluated critically. Expert E12 stated that,

"Accreditation is indeed peer review process, which check for value adding in HEIs and help to continuous improve."

Faculty member C said,

"In accreditation process, the system, method, and practices are evaluated including projects, internship program, syllabus, exam, facilities etc. The faculties are enquired about qualifications, performance, research, job satisfactory etc."

The data (E4, E5, E6, E7-E11, E12, E14, B, C, E, F, G, H, I, J and K) evident that in accreditation process check system and curriculum. The data (E4, E5, E6, E7, E8-E11, E12, E13, E14, E15, A, B, C, D, E, G, H, I, J, K, L and O) illustrated that in accreditation check system and facilities entirely; check program, teachers qualification, student teacher ratio, IT and services, journals, student classwork, marked classwork, exam papers etc. Expert E9 stated that,

"Accreditation team looks into courses, academic program, content, assignment, exams, on sampling basis. Accreditation team also interview students and faculty member. However, teaching pedagogy is missing in their process."

The data (E4, E5, E7, E8, E9, E10, E12, E14, E, G, H, I, J, O and S11) showed that accreditation team interview students and teachers during accreditation process. Faculty member E stated,

"The degree accreditation is not that simple, its evaluate each and every part of the system from teaching to administrative practices and program quality, like check curriculum, exam papers, student class work, marked classwork, facilities, interviews staff, teachers and

students, see results of top students, middle students, etc. Accreditation team examines facilities and services, faculty staff, technical staff, technician and admin staff. The accreditation program evaluates all inputs required in transferring knowledge process and sees outcomes are satisfactory and achieved targets, then approve program for further five years."

The results showed that the LSHEIs prepare themselves for meeting standards defined by accreditation bodies. First, internally LSHEIs See their Situation to meet that accreditation standards and improve if see any gap. Then externally See Situation by accreditation bodies. As whole of this process, improve LSHEIs after seeing their situation internally and externally. Then second, another way of See Situation internally is feedback practices. The common practice of feedback on courses and teaching found common in LSHEIs, as well as its practice during and at the end of semester. The results showed that open ended questionnaire in feedback from students, formal feedback of faculty member, graduate feedback after employment and their employers feedbacks are rarely practiced.

4.4.4.2 Principle 13: Decision by Consensus

The Principle 13: Decision by Consensus comprised of four codes, in which covered practices in which involve students and faculty members in decision-making.

It is found that the purpose of feedback is to improve further and incorporate the comments of students, code DC-C1 reflected feedback effectiveness from responses (E1, E4, E5, E6, E7, E8, E9, E10, E11, E12, E13, E14, E15, E16, F ,G, H, I, J, K, L, M, N, O, S1, S4, S5, S9, S10 and S11). The data (E1, E4, E5, E6, E7, E8, E9, E10, E11, E13, E14, E16, A, B, C, G, H, I, J, K, L, M, N, O, S1, S2, S6, S8, S11, S12 and S14) depicted that students complains responded and solve issues, compiled information in code DC-C2. Their valid concerns play main role in decision-making.

The code DC-C3 emerged from responses of data (E6, E7, E8, E9, E10, E11, E13, E15, E16, B, C, F, G, H, I, J, K, L, M, N, S4, S5, S7, S8, S11, S12 and S14), exhibited that the faculty members and students meetings are two way communication to develop trustworthy working environment. These meetings help them to identify constructive decision on improvement projects and practices. Faculty members (B, D, H, I, L and M) informed that faculty members and students input is taken in annual buying process of new equipment, generated code DC-C4.

As discussed in principle 12: See Situation that feedbacks taken from students and faculty members to look their perspective on practices. These feedbacks became sources to make

improvement decisions on basis of their responses. It helps LSHEIs to make decisions on basis of consensus developed through feedback responses. Another aspect of decision by Consensus found that faculty members and students work on improvement projects and involved in decision making to finalise decision together. It also showed that faculty members and students involvement in decision of facilities development i.e. buying new lab equipment.

4.4.4.3 Principle 14: Learning Organisation CI

Lastly the four codes found in Principle 14: Learning Organisation CI of LSHEIs practices. These codes focused on concept of becoming learning organisation where faculty members, students and LSHEIs practices continuous improve.

The code LO-C1 revealed that the LSHEIs ensure continuous improvement in services and every five year program reviewed, evidences found from data (E4, E5, E7, E8, E11, E12, E14, E15, E16, B, D, G, H, I, J, K, L, M, N, O, S2, S4, S6, S8, S11, S12, S13 and S14). The results showed that LSHEIs also have Business Process Improvement practice through internal team or consultants. Expert E15 stated that,

"In UK, we assess every five years and change program as per industrial changes like robotics are requirement of time then make it part of program. Business Process Improvement also led continuous improvement"

Expert E7 said that,

"For continuous improvement, we take feedback seriously and incorporate it in review of courses or program. We have formal review program every five year, also see expectations of industrial partners. We do process mapping in non-academic too."

Faculty member I shared their practice that,

"We have School Teaching Learning Committee (STLC) linked with UK in which intercampus, China and UK representatives' committee review program. Our three campuses representatives have dialogue on module and its content. Different matters evaluated in program review after 3-5 years including policies, strategies, quality, feedbacks, and market demand, and altogether that meeting improves practices."

The code LO-C2 showed that the LSHEIs practices encourage faculty members to keep learning and continuous professional development through conference participation, trainings, funding availability, and mobility. The LSHEIs encourages faculty members continuous professional development to learn and grow in career, evidences found from responses (E2, E4, E5, E7-E16, A, B, C, D, F, G, H, I, J, K, L, M, N, O, S1, S2, S5, S11 and S14). The experts

and faculty members stated that conferences encouraged, evidences from data (E2, E7, E9, E11, A, F, G, H, I, J, K, L and O), and funding opportunities available for research, evidences are (E7, E11, E12, E16, A, B, F, G, H, I, J, K and O). The resources are scarce so within limits faculty members get opportunity of funding for research projects, responded faculty members A and B. Faculty member H showed concerns that research funding are bit challenging, especially difficult for foreigners. Faculty member O showed concern that,

"Research budget is very limited, we have conference budget but not sufficient, spend own money too. This is my concern that not enough monetary fund."

At UNMC, Faculty member (D, H, I, J, K and N) revealed that there is teaching diploma for training teachers for training. Faculty member I told about training on Teaching in LSHEIs and stated that,

"Teaching styles and deliveries are first learned through 'Teaching in HE' courses which is compulsory for fresh faculty members. Even fresh graduates are also given opportunities to learn these courses of teaching in HE."

Expert E7 stated that,

"Training are arranged to improve teaching skills and learn techniques to teach effectively."

Faculty members D, E and M, highlighted that teaching capability of faculty member is critical in teaching process and efforts for its continuous improvement is mandatory for LSHEIs. Faculty member D said,

"Teaching is most value adding process. Our university concentrated in improving teaching capability and in Nottingham, lecturers are trained through a module on how they can improve teaching. It's improving teaching capability."

Faculty member A said there could be chances of faculty member mobility to other campus, or trainings but rare. Faculty member H shared that,

"Faculty member has opportunities of participation in teacher trainings, mobility and teaches in other campuses and research collaborations."

The Experts (E4, E5, and E9) recommended that training for faculty member encouraged on Lean system to effectively apply Lean system in HEIs. Expert E4 emphasised teachers training require on Lean system, he added;

"Previous VC didn't know anything about Lean system as business process improvement technique, as usually people don't know then difficult to convince them on some such

improvements or projects. I suggest that there is need to train faculty members on Lean, value adding, NVA and Business improvement area to effectively adopt Lean system in academics."

The Code LO-C3 generated about evaluation criteria of faculty member to continuous improves them and their improvement reflects in improvements of students learning. It showed that the difference of opinions in practices from department to department or in different LSHEIs. The data (E11, E12, E14, E16, A, B, C, F, G, H, I, K, L, M and N) showed that faculty members evaluation main criteria is teaching capability. Faculty member F stated that,

"All faculty members are academically PhD degree, preferably fresh PhD with quality publications of same research area. Industrial experienced in faculty member search is not necessarily required but if get then good combination, definitely add value, but rarely found. Preference is given to those who have teaching experience, as UNMC more focused on teaching and such skills in each faculty member. Many other universities prefer publications, whereas UNMC first preference is teaching capability."

However, Expert E12 and faculty members D and L opinion was that teaching skills assessed from examination results of taught course, student's results better reflects skills. The data (E8, E13, G, H, I, J, K, L, M and N) revealed that faculty member evaluated on four aspects including teaching, research, administrative skills and impact on society. Expert E9 showed concern about teaching evaluation that,

"Here common assumption is that if faculty is doctoral then he will be okay. This assumption is wrong. There are different aspects which should be considered in evaluation and assigning courses."

The responses revealed that faculty member's number of publication recorded and citation number for evaluation of performance, evidences found from data (E7, E8, E9, E11, E12, E14, E16, F, G, H, I, J, K, L and M).

The responses (E10, E13, D, E, F, G, H, I, J, K, L, M, S1, S7, S9, S11 and S12) generated code LO-C4, which showed that the students reflect on their performance and assigned with 'personal tutor' (mentor), for this purpose. There is requirement of meetings with tutor/SV annually and personal tutor recommend some trainings or other guidance on performance and problems faced by student. According to Faculty member G,

"All students have personal tutor, first students can avail counselling at department level through tutors, and if any further requirement then refer to wellbeing learning centre."

Student S7 stated that,

"It is our policy to assign tutor to each student, who always guide individual on different academic or other issue or any adjustment required or on career throughout the degree program."

The results showed that LSHEIs have practices of continuous improvement in services, faculty members and students annual review process, professional development and evaluation of faculty members and assigning tutors to students, respectively. Faculty members and students learn and reflect to continuous improve through these practices.

There are total nineteen codes generated at fourth Principle Level of Continuous Improvement, and centred on continuous improvement of LSHEIs practices. The three principles concluded with practices found from eleven codes for principle 12 (See Situation), four codes for Principle 13 (Decision by Consensus), and four codes for Principle 14 (Learning Organisation CI).

The LSHEIs practices altogether with four Principle Levels showed 85 codes. These codes concluded different LSHEIs practices related to each principle. The next section will discuss the outcomes of these LSHEIs practices from the informant's point of view.

4.5 Lean System Outcome

There are nine codes of Lean System Outcome, which are generated from the experts, faculty members and students interviews, as shown in Table 4-8.

Table 4-8 Data Conceptualisation from Qualitative Data for LSO

S. no	Axial Codes	Themes (Open Codes)	Data Items	New Naming	Reference		
					Faculty Members	Students	Experts
120.	LSO	Resourceful	Making every individual useful resource Equipped with technical and soft skills to get job	**LSO-C1**	C, F, G, H, I, J, K, L, N, O	S4, S5, S7, S11, S12	E1, E2, E4, E5, E6, E7-E11, E12, E15, E16
121.			Lifelong learning		L, N	S1	E1, E4, E5, E7, E8, E9, E11, E12, E14, E15
122.		Student Satisfaction	Improved student satisfaction	**LSO-C2**	D, F, H, I, J, L, M, N	S1, S4, S5, S9, S10, S11	E1, E4, E5, E6, E7, E9, E10, E11, E12, E14, E15, E16
123.			Record student feedback (SET, SEM) scores		A, B, C, D, E, F, H, I, J, K, L, M, N		
124.		Waste reduction	Waste reduced or eliminated	**LSO-C3**	J, L, M	S4, S5, S7, S11, S14	E4, E8, E9, E11, E12, E13, E14, E15, E16
125.		Resources utilisation	Efficiently Resources utilised Saving cost	**LSO-C4**	J, L, M, O	S1, S4, S5, S7, S8, S12, S14	E1, E4, E5, E8, E9, E11, E12 , E13, E14, E15, E16
126.		Saving cost	Less paperwork		L, N	S1, S5, S8	E4, E8, E12, E13
127.		Higher Job Demand	Graduates get higher job calls easily highest in getting job	**LSO-C5**	A, B, C, D, I, K, L, M, N	S2, S5, S6, S9, S10, S12, S13, S14	E7, E9, E12
128.		Ranking and Repute	More market demand because of university name and ranking our graduates follow advanced (European) curriculum and well aware strengths of skills in graduates	**LSO-C6**	C, D, E G, I, K, L, N		E7, E12
129.		Quality of Education	Provide with quality of education Meet market needs	**LSO-C7**	A, E, F, G, H, I, J, K, L, M, N, O	S4, S5, S7, S11, S14	E1, E2, E4, E5, E6, E7-E11, E12, E13, E14, E15, E16
130.		Culture	Respect, empowerment and participative culture promoted	**LSO-C8**	A, B, D, F, G, H, I, J, K, L, M, N, O	S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S12	E1, E4, E5, E6, E7, E8, E9, E10, E11, E12, E13, E14, E15, E16
131.			Faculty member cooperative and facilitator		F, G, I, K, M, O	S1, S2, S3, S4, S6, S8, S12, S13 , S14	E4, E13
132.		Multi-cultural its strength	Most highly cultural campus as compare to UK and China campuses.	**LSO-C9**	A, B, D, J, K, L, N	S6, S8, S11, S12	

Source: Author

Expert E12 depicted that Lean system bring culture of quality, student satisfaction, efficient resources utilisation, quality of environment and education, teacher learning, balanced workload, respect for people, helping people, process improvement and continuous improvement. Expert E9 stated that,

"Lean system brings higher throughput of student, their satisfaction, problem solving skills, less cost, efficient operations, measure of quality, employ satisfaction, low turnover, less conflict with staff and many other inter related benefits."

The first LSO showed that the students become competent and skilled to get better job opportunities after graduation. The code LSO-C1 generated from evidences found in data (E1, E2, E4, E5, E6, E7-E11, E12, E15, E16, C, F, G, H, I, J, K, L, N, O, S4, S5, S7, S11 and S12) about developing each individual into useful resource. It means transferring knowledge, which makes them resourceful in career. Expert E5 emphasised that,

"Student is value added if able to employee, able to do research, and more competent when go to job."

The LSHEIs process makes their graduate's resourceful person accompanied with multiple skills, which focus to enable to be employed and benefit society. Faculty member C while talking about Value adding in LSHEIs said,

"Our product is our student, when they graduate then either employed, or jobless or precede further studies. This is an output of our production."

It is found that value in terms of knowledge is that which practically applied in field through job; otherwise, graduates proceed in further advance studies with previous value add of knowledge. According to E2,

"The value adding are in fact individual student learned and become resourceful, employed, or researchers."

The responses (E1, E4, E5, E7, E8, E9, E11, E12, E14, E15, L, N, and S1) showed that students get lifelong learning in LSHEIs. According to expert E1, courses are designed to result effective skills learning and bring lifelong learning.

The second LSO found that the student's satisfaction increased in LSHEIs, and generated the code LSO-C2 generated from data (E1, E4, E5, E6, E7, E9, E10, E11, E12, E14, E15, E16, D, F, H, I, J, L, M, N, S1, S4, S5, S9, S10 and S11). The example found from responses (A,

B, C, D, E, F, H, I, J, K, L, M and N) that the scores of student feedback (SET, SEM) scores are recorded to evaluate student satisfaction.

The third LSO is reduced waste in process in LSHEIs. The data (E4, E8, E9, E11, E12, E13, E14, E15, E16, J, L, M, S4, S5, S7, S11, and S14) generated code LSO-C3 and indicated that the facilities and funds are better utilised in each service to minimise waste in process. Expert E4 while talking about underutilised facilities, said that,

"Facilities are not properly utilised in cases when there are 100 students in class and 250 seats in classroom then 150 seats are not utilised, 50 computers in lab and 20 students in class to use at a time, or student longer distance movement from one campus to another, one classroom to another, Poorly timetable scheduled, teachers time and workload not balanced and students (customer) suffering in wait or queue to avail different services. All these led to the waste in process. The queue or wait time can be avoided through appointment system which is best to solve this problem. The Lean system addresses all such inefficiencies in resources utilisation and cost associated with all these."

The code LSO-C4 depicted that resources are efficiently and better utilised, and saves cost, evidences found from data (E1, E4, E5, E8, E9, E11, E12, E13, E14, E15, E16, J, L, M, O, S1, S4, S5, S7, S8, S12, and S14). Expert E11 shared experience of efficiently using facilities through improvement plan and demonstrated that,

"Once we checked in classroom, checked all physical resources, check how many monitors, how many people using PC, how many students present, and in this way analysed all resources and checked their utilisation to improve all this. It ultimately saved cost. We are very student focused otherwise student don't come here."

The response (E4, E8, E12, E13, L, N, S1, S5 and S8) stated that less paperwork when working, and many such processes saved cost and improved by using less paper e.g. online email instead of letters in hard form which also delays, recycle pages, etc.

The fifth LSO found from responses that graduates have better employment opportunities after graduation from LSHEIs. The data (E7, E9, E12, A, B, C, D, I, K, L, M, N, S2, S5, S6, S9, S10, S12, S13 and S14) indicated that graduates get higher job in corporates and minimum ratio of graduates who unable to get good opportunity, generated code LSO-C5. It is noted that the employment is now worldwide issue and many graduates worldwide facing unemployment and industries downsizing challenges. Despite of this fact, the UNMC employment rate found satisfactory from faculty members and students perspective. Faculty member I told that

graduates demand is quite high and their employability is almost 90% within six months. Faculty member B acknowledged, while answering about graduates employment that,

"The exact employment statistics could be checked which is at satisfactory level. Our graduates are highest in getting job in this country and almost employed above 90%."

Faculty member A also stated that,

"International campuses are quite good, quite popular so their graduates get higher and better job opportunities. The records show satisfactory statistics in employment of our campus graduates."

The sixth LSO showed that the LSHEIs have better ranking and repute. The code LSO-C6 from responses (E7, E12, C, D, E G, I, K, L and N) revealed that high ranking, repute (i.e. UK campus) and strengths of skills in graduates help them in increasing market demand. Expert E7 stated that,

"We are among top 50 universities in world that's why graduates are quite employable. They have learned different skills and industrial experience before employed."

Faculty member I revealed that,

"Graduates have high demand because of name of university, industry recognise our graduates, skills enhanced through graduates participation in competition and different platforms. We have better personal development goals for our graduates."

Faculty member N stated that the ranking and repute of HEIs matter in graduates increased employment for example UNMC is student focused, UK degree, dynamic in changes, multicultural, having diversity, exchange of students, research experience etc. According to faculty member D, more market demand because graduates follow European curriculum and well aware.

According to faculty member C,

"More market demand because our graduates good in designing, our graduate's strength is designing. Secondly, UNMC is one of the oldest international (UK campus) in region. Best performance measure or outcome is that each year graduates get job or able to pursue education."

The seventh LSO is quality of education in LSHEIs. The LSHEIs provide quality of education which meets market needs, generated code LSO-C7 and evidences found from data (E1, E2,

E4, E5, E6, E7-E11, E12, E13, E14, E15, E16, A, E, F, G, H, I, J, K, L, M, N, O, S4, S5, S7, S11 and S14).

The eighth LSO is positive cultural change in LSHEIs, where everyone owns their work, motivated, empowered, and cooperative with each other. The data (E1, E4, E5, E6, E7, E8, E9, E10, E11, E12, E13, E14, E15, E16, A, B, D, F, G, H, I, J, K, L, M, N, O, S1, S2, S3, S4, S5, S6, S7, S8, S9, S10 and S12) generated code LSO-C8 which depicted that the respect, empowerment and participative culture promoted in LSHEIs. Expert E7 stated that,

"Lean system improves respect toward people, visual display, process map, supportive leadership, expertise in Lean kata (everyone must know tools and techniques), continuous improvement, leader involvement and see on workplace."

The responses (E4, E13, F, G, I, K, M, O, S1, S2, S3, S4, S6, S8, S12, S13 and S14) advocated that teachers role is more like a facilitator and cooperative with students in LSHEIs.

The code LSO-C9 generated particularly about UNMC multicultural benefits, extracted from responses of (A, B, D, J, K, L, N, S6, S8, S11 and S12). It showed that UNMC is most highly multi-cultural campus as compare to UK and China campuses, it is strength to provide students different cultural exposure and learning. Faculty member D also admired that UNMC students good in communications and multicultural campus brings more learning and exposure to students by seeing different people norms and culture, as around 54 countries graduates learning there. It highlighted that the culture of LSHEIs plays vital role in satisfactory delivery of teaching and services.

The results showed that Lean system bring changes in different HEIs practices and become more students centric, teaching focused, meets industry needs, hub of quality education, cultural change, visual management, continuous improvement, greater employability of graduates and efficient resources utilisation. There are eight LSO found from responses of interviews, it includes improvement and increase in graduates competency, satisfaction, efficient resources utilisation and cost saving, waste reduction, employment opportunities, ranking and repute, quality of education and cultural changes. The qualitative results showed the evidences of primary and secondary LSO identified.

4.6

Lean System Initiation Challenges

The interviews results indicated Lean system requirements and challenges faced in initiation. Expert E3 posited that leader's commitment is first required to successfully progress. Many

organisations adopted its integrated approach with Agile, six sigma and operational excellence. Expert E8 stated that,

"Lean is intuitive. HEIs can start with their own tool. Initiation can be made by three elements; first top management support and strategy, make teams (students and teachers representative), and then go to process and define process."

Expert E12 said that when people involve and improve process then dedicated for improvement, they need time and hard work, resources, support of management and HEIs regulation. Expert E7 recommended to begin with Lean system tools like VSM, know voice of customer, visual management, reduce lap time, theory of constraints, identify bottlenecks, rectify problem and causes, and bring pull system. Expert E4 highlighted to begin with faculty members by training them on Lean system. In this way they have operational skills that no waste efforts made by them and they know to apply value add and waste concepts in their work. Expert E5 posited that,

"The universities are not place with operation mind. This is important to understand that differences and how things are done. Universities do not have operational lines; do not really have operational backbone. Mostly people in universities do not have good expertise in operational skills and not well aware about streamlining process, its product and running plans accordingly. Lean operational skills means specific operational skills like value adding, rectify waste in process, how improve process, how can things run efficiently. Universities find it difficult to implement Lean system because far from operational perception and consider Lean as operational and applicable only in industries. In universities, Lean system begins by determining where problem is and how to improve it. It works slowly to get through and basically case by case to able to successfully implement Lean system."

Expert E7 informed that if any department had Kaizen workshop but did not bring cultural change in whole university, with time it quit changes and people leave it practices. It is due to lack of understanding and uncertainty of return as it takes time to see its benefits. Expert E16 depicted,

"There is no easy way to start! In HEIs, it is bit harder to implement or change. Important to start with leadership support and dedicated team, in fact Lean is building capacity, which requires cultural change. It requires working at least two years to see Lean benefits."

Expert E9 informed that there is lack of academic freedom and mostly workshops for Lean educators based on how to teach Lean module and rarely on applying Lean in teaching. To

initiate require more administrative work; hire consultants, training, small office, internal consultant to improve. One challenge is those faculty members who are biased towards Lean system and create various resistances in breaking traditions. Expert E8 depicted that for Lean system no need of excessive funding but more important to get people to support and customised tools which lead to its success. Expert E12 stated that,

"Business improvements encourage Lean implementation. Business improvement framework covers training courses, applicable tools and techniques required to improve, help staff to improve, have some partners, resources to improve and arrange occasional events."

The results showed that initiation challenges are its awareness, operational perception, top-level support, dedicated team, customised tools; mitigate cultural resistance and slower benefits.

Recommendations

4.7

During interviews, experts, faculty members, and students gave some suggestions while discussing niche areas, as shown in Table 4-9.

Table 4-9 Informants Recommendations

Principle	Recommendations	References
Philosophy		
Principal 1: Long Term Philosophy	Long lectures more content so aim to make comprehensive	S2, S7
	Contents long lasting and quality of education sustain in future	A, S9, S10
	Content more practical and real examples	S9, S10
	Formalised system to learn and evaluate Soft skills	A, H, S9
	Evaluation system required of students soft skills	E4, E5, A, H, S6
Process		
Principal 2: Create flow	More faculty member and specialised personnel require.	S2
	More discussion on teaching pedagogy and individual interest	E9
	More labs, experiments and equipment	A, B, S3, S10, S14
	More space, especially in laboratories	B
	More online research publications should be freely accessible.	S6
	Library access should be 24 hours.	S6
	Libraries should be more used by students	A, B
	Classroom and books going far because of technology but their relation should be maintain with student to learn in real	A, B

	More books required in libraries	S6
	Foreigner students visas issue	S6
	Improvement in parking and security facilities	S6
Principal 3: Use pull	Check for out-dated, wrong order, irrelevant contents	E9
	Focused assessment with relevant questions	E9
	Modules selection should be flexible	S9
Principal 4: Levelled workload	Faculty member work life balance	E7
	Building and rooms different for different modules. Scheduling and different places access need to be improved	S1, S9, S10
	Exam room arrangement should be improved like student know place in advance, enter exam room earlier 10 minutes	S9
	Improve distance to reach classroom or other facilities	E5, E7, S9 and S10
	Class scheduling should be improve	S10, S12
Principal 5: Eliminate Rework	Try less content repetition and duplication.	E7, E9
	Modularisation of modules instead of repetition	E4
Principal 6 Standardisation	Flexibility in marking/ assignment and different other practices.	E9, J
	Incorporate Teaching pedagogy in accreditation process.	E9
Principal 8: Technology	Use of technology to make session more blended	I
People and Partners		
Principal 9: People Growth	Evaluate student class participation	S9
	Lecture should be more interactive than independent	S9
	Small group teaching to be more interactive	G
Principal 10: Develop People	Projects arrangement should be systemise and consistent	A
	ensure students learning from industry exposure	A,C
Principal 11: Partners Growth	Critical industrial board involvement in curriculum design and program review	E6
	Drive more industry collaboration and knowledge transfer	A
	Formal platforms for faculty member collaboration	K
	More Funding from corporations to able to do research	A, B
	More research, strong collaboration with corporations for research.	A
Continuous Improvement		
Principal 12: See Situation	Require qualitative and quantitative metrics to measure performance of faculty member and to evaluate system.	A
	Proactive approach required in feedbacks	E12, E13
	Need open-ended questions and discussion.	E8, E9, E13, K
	Teachers also prefer independent feedback	E4, E8, E13
	Ensure all students give feedback	E11, S9, S10
	Formal way to take feedback from faculty member	E9, H and L
Principal 14: Learning organisation CI	Encourage faculty member to keep learning and continuous professional development.	A, B
	Faculty member learn operational skills and Lean system	E4, E5, E9
	Increase Research budget	H, K
	Conferences exposure should be increased.	A, B

	More collaboration of faculty member with national and international institutes.	B
	Faculty member should also conduct research in industries.	A, B
	Exchange of teachers for teaching with other campus	A, B, D
	UK teachers exchange can help in specialised trainings	B

Source: Author

In Principle 1: Long Term Philosophy practices, the informants (A, H, and S9) recommended adopting formal practices of soft skills learning and evaluation. Faculty member H said that,

"In number of modules, presentations are part of assessment to improve soft skills. However, there is no formal way to evaluate particularly soft skills only, which is required to ensure its learning."

Faculty member A highlighted to develop measure or evaluation system for soft skills of students. As soft skills, important 'value' to be learned during this phase but need to be evaluated systematically. Secondly, faculty member A emphasised to add formalised training to learn soft skills. Faculty member A recommended increasing collaboration with company for research purposes, and adding more 'value' of research. It also posited to increase research and its collaborations.

Expert E9 highlighted to seek out dated, irrelevant, wrong order or repetitive course content in curriculum. Expert E4 suggested applying modularisation concept in LSHEIs curriculum, and avoiding content or module repetition through it. Ultimately, it will bring efficient resources utilisation in addition. It is also suggested to develop comprehensive course material, which brings lifelong learning. Students highlighted to improve lectures and curriculum by making more comprehensive, effective, and practical. Expert E6 pointed out the industrial board critical involvement in curriculum and said that,

"If industrial board rarely impact on curriculum then student unable to learn what industry needs. It is important to know what employee need. Few industrial boards exist but very general in nature not guide specific. The role of industrial board should be very active and concerned in HEIs curriculum and program review."

Regarding Technology (principle 8), technology involvement is also recommended in lectures that become more interactive and blended. S9 highlighted to make faculty member and lecture more interactive than independent. S9 identified requirement of evaluation of student class participation, and modules selection should be flexible.

In context of Process (Second Principle Level), the informants recommended number of practices. S10 responded that class scheduling should be improved for Levelled Workload.

The classrooms and facilities distances should be minimised showed from data (E5, E7, S9, and S10). Faculty members A and B suggested improvement in facilities of laboratories, equipment, and library to Create Flow. Faculty member A said that students getting far from classroom and books day by day because of technology but their relation should be maintain with student to learn in real. The results showed the huge class is also constraint in interactive learning, which recommended to be minimised. According to faculty member G,

"There is a constraint of large student number. If class is huge then it is difficult to equally transfer knowledge with interactive session. To foster interaction it is recommended to practice small group teaching. If student teacher ratio is good then better cooperative learning environment and lectures highly interactive, in case it boost then problem."

For Use Pull (Principle 3) in assessments, it is recommended to examine through relevant questions to map with industry requirements. Expert E9 said that,

"Lean university focus assessment, include questions that important to know to leave university and apply in industries. Very focused assessment is essential."

Secondly, it is emphasised on flexibility in assessment and teaching, as following defined guideline put limitations on faculty members in these processes. Expert E5 suggested Lean system adoption in assessment process and stated that,

"In exams initiate and identify VA and NVA activities to improve, double check for fool proofing

e.g. I put mark in spread sheet then I emailed to another person to check for error."

It is important to aware different teaching pedagogies to Create Flow. The concern showed to encourage and increase student participation and flexibility in courses selection. It is found that informants recommended faculty members trainings as per individual needs, budget expansion, workload balance, industrial research, collaboration, and evaluation. Faculty member A recommended formulating qualitative and quantitative measure of faculty member's performance and system. Faculty members A and B highlighted to increase faculty's exposure of teaching experience in other campuses, conferences, trainings, and research for continuous professional development. Experts (E4 and E9) emphasised on Faculty member training of Lean system and operational terms. Expert E4 and E9 suggested to educate *people with operational skills, that there will be no waste efforts from them and they know to apply value add and waste concepts in their work. It is recommended to train faculty members on Lean system and operational terms.*

Faculty members A, B, and C suggested ensuring students learning from industry exposure, and let them learn things that cannot be provided in-house to 'Develop People'. Industrial research, projects, and funding need to increase more for credible learning.

For See Situation (Principle 12) through feedbacks, informants suggested proactive approach, qualitative response to get exact improvement domain, ensure all students submit feedback, formal faculty member feedback. Expert E9 informed that feedback is useful if descriptive and see comments. Score and statistical is less understandable to where improve. Expert E13 recommended that,

"In feedbacks, adopt more proactive approach instead of reactive. Not like in survey, need open discussion and comments in feedback. Good teachers do independently."

Expert E4 shared own experience that,

"I have my own feedback questionnaire. At the end, I give paper to them and ask to write three things they liked, three things they did not like, and three things I should improve. Sometime it is more useful in individual improvement. We prefer feedback boxes to drop feedback on different services."

Faculty member K stated that,

"Feedbacks may be not fairly, sometime biased by students as they get good marks then give good feedback and if bad marks then give bad feedback. I suggest changing questions in questionnaire to solve this issue."

E11 said that all students does not fill feedback either we remind in last lecture to fill feedback forms, it should be improved. Students responded to ensure feedback submitted by all student population, and facilities should be further continuous improve. Faculty member H told that there is no formal way to take feedback from faculty member, just HOD or faculty member discuss informally with each other, which unable to systematically hear voice of faculty members. Lastly, the results showed that experts, faculty members, and students recommended different changes for HEIs for further improvement in practices.

CHAPTER 5

Chapter 5 Discussion and Conclusion

The key findings of this research are discussed in depth in this chapter. First section provides insight of discussion of qualitative results linked with literature review. It is followed by conclusion, which summarised the outcome of this research with reference to the research questions. Next section exhibits implication of research; theoretically, practically and methodologically, respectively. Lastly, reveals limitations and future perspective with concluding remarks.

Discussion on Effect of LSHEIs Practices on Lean System Outcome

The first LSO identified in literature review and qualitative results is developing students competencies and skills to become resourceful, in other words more value added (Yorkstone, 2019; Sunder & Antony, 2018; Thomas et al., 2017; Emiliani, 2016; Sunder, 2016b; Gupta et al., 2016; Isaksson et al., 2013; Oehmen et al., 2012; Doman, 2011; Emiliani, 2004a; Dahlgaard & Ostergaard, 2000). The second LSO found from qualitative results is increased student satisfaction through LSHEIs practices (Yorkstone, 2019; Anthony & Antony, 2017; Sunder, 2016a; Sunder, 2016b; The Complete University Guide, 2013). The qualitative results in this research highlighted that it could be measure through feedbacks scores, aligned with findings from Sunder (2016b). Another LSO found in qualitative results is waste reduction, which led to better utilisation of funds and facilities, which confirms the previous findings of Sunder (2016b) and Douglas et al. (2015). The qualitative results also revealed another LSO of higher employment rate of graduates, consistent with the findings of Thomas et al. (2017) and Sunder (2016b). Sunder and Antony (2018) and Sunder (2016b) findings showed that the HEIs repute and ranking are also influenced from LSHEIs practices, which is further validated from qualitative results. The qualitative results highlighted that the one LSO is improved quality of education, which is aligned with the studies conducted by Sunder and Antony (2018). Another LSO depicted in previous studies (Anthony & Antony, 2017; Douglas et al., 2015; Balzer et al., 2015; Waterbury, 2015; Radnor et al., 2006) is culture of employee empowerment, owning their work, work with more satisfaction, motivation, and hostile to change; and its evidences also found in qualitative results. Interestingly in qualitative phase, the results of expert's interviews were validated from students and faculty member's interviews.

The following sections will discuss in detail all these LSHEIs practices at each Principle Level, through literature review and its relation with qualitative results.

Philosophy

5.1.1 At the First Principle Level of Philosophy, the qualitative study identified eight LSHEIs practices for Long Term Philosophy (Principle 1). It highlighted that the LSHEIs sets long term philosophy, includes defining learning outcomes, delivering theoretical and practical knowledge, learning research skills and socio economic development. The evidences found from experts interviews and validated from students and faculty members responses. In Long Term Philosophy practices, the outcome base education were supported by literature (Emiliani, 2016; Douglas et al., 2015) and evidences also found from interviews. LSHEIs not only provide field knowledge to graduates but also learn them different soft skills to compete and sustain in different environments. The results showed that the industries also demanding the employee with expertise in multi skills to work in challenging work environment (Paramasivam & Muthusamy, 2012). The interviews results showed that the LSHEIs encourage research (Anthony & Antony, 2017) through technical papers at undergraduate level. The practices of socio economic development also found through skills impartment (Aljanobi, 2015) and research impact.

HEIs are providing outcome based education and faculty members dedicated to incorporate skills required in practical life. These findings are consistent with the findings of (Sunder & Antony, 2018; Thomas et al., 2017; Emiliani, 2016; Sunder, 2016b; Balzer et al., 2015; Douglas et al., 2015; Kahl, 2014; Higher Education Statistics Agency, 2013; Paramasivam & Muthusamy, 2012; Doman, 2011; Ranjit, 2009), that LSHEIs emphasis outcome based education in which faculty member teach practical knowledge and soft skills in addition theoretical knowledge.

Process

5.1.2 At Process Level, the interviews responses showed different practices at each Principle Level. In parallel to students, faculty members are also found one of the most important stake holders of LSHEIs, as faculty member are playing vital role in transferring knowledge to students. The qualitative results showed that the Create Flow (Principle 2) is first possible with competent faculty member teaching in LSHEIs (Balzer et al., 2015), however qualitative results also showed that faculty members with or without industry experience both considered. It is found that their recruitment, capability of teaching training and different teaching methodology practices (Thomas et al., 2017; Gupta et al., 2016; Emiliani, 2016; Isaksson et al., 2013; Doman, 2011; Emiliani, 2004a; Dahlgaard & Ostergaard, 2000) are considered to Create Flow. The qualitative results are also consistent with the findings of Sunder & Antony (2018) and Sunder (2016b), that the availability and maintenance of different supporting facilities is

important to Create Flow. However, student's number of responses on maintence preference was comparatively less than responses of experts and faculty members. The paper based working (i.e. number of photocopies, procedural delay due to paperwork or paper work instead of technology use) is waste in Create Flow processes, it is identified in qualitative results and aligned with findings of Yorkstone (2019), Sunder (2016b) and Douglas et al. (2015). The practices discussed by experts were validated by faculty members and students results.

The findings of Thomas et al. (2017), Emiliani (2016), Hess and Benjamin (2015) and Rodger (2010) highlighted the Use Pull (Principle 3) practices, similar to qualitative results. It recommended that the teaching process fulfil students and industry needs; and curriculum with advance and relevant contents are part of LSHEIs practices. However, evidences of students number of responses found less than experts and faculty member's responses regarding teaching as per students and industry requirements. In contrast, in curriculum relevance evidences found equally from students, faculty members, and expert responses.

For Levelled Workload (Principle 4), the literature highlighted the availability of facilities for their respective services and balanced workload to avoid queue of students for that service in LSHEIs (Balzer et al., 2015). Further, the literature review and qualitative results supported two other practices of timetables better scheduling (Thomas et al., 2017) and facilities at walking distance to avoid time wastage of student and faculty member in unnecessary movement (Suhaimi et al., 2017; Douglas et al., 2015). However, the faculty member and students found less convinced with the implementation of less distance in facilities infrastructure. In contrast, many experts highlighted importance of levelling time in accessibility of facilities by infrastructure with less walking distance. The qualitative results brought forward one waste of imbalance workload, which led to deficiencies in managing time for research.

In Eliminate Rework (Principle 5) practices, the literature and qualitative results aligned in practices of avoiding repetition in contents and course (Waterbury, 2015; Dahlgaard & Ostergaard, 2000), and also minimum course repetition (re-sit) of students (Thomas et al., 2017; Rodger, 2010). The interesting finding in qualitative results is practice of the student support services, which are provided to eradicate any psychological or physical issues (i.e. counselling, mentoring, and disability support) (Yorkstone, 2019). Interestingly, practice of student support services in eliminating rework highlighted more by students and faculty member, comparative to experts interviews. Further qualitative results brought into view two wastes, one quality compromised in supplementary attempts. Second, one is moderation process in exam marking, which followed to improve peer review, on the other hand led to rework through double marking in it.

The qualitative results showed that the practices of SOPs defined in quality manuals for all services (Radnor & Bucci, 2011; Doman, 2011; Emiliani, 2005; Emiliani, 2004b) and professional bodies accreditation (Thomas et al., 2017) for Standardisation (Principle 6). The informants in interviews identified different SOPs, i.e. moderation in exam in which sample exam papers rechecked by internal and external moderator. Interestingly, the evidences of standardisation implementation found dense from students, faculty member, and experts interviews.

Both literature and qualitative results highlighted the practice of visualisation of information and processes for visual management (Yorkstone, 2019; Emiliani, 2016; Sunder, 2016b). The significant finding in qualitative results is practice of updated website and using it as a tool of Visual Management (Principle 7). The evidences for visual management implementation found from experts validated by students and faculty member's interviews, closely.

Lastly, in Technology (Principle 8), the practices findings are consistent with Thomas et al. (2017), Emiliani (2016) and Comm and Mathaisel (2005b); first by commonly usage of advance technology in processes; secondly hybrid learning through face to face and online learning; and then information smooth and rapid flow through technology use. The remarkable finding in qualitative result is about the centralisation of HEIs parent and sub campuses through technology use. However, few responses in qualitative results also recommended embedding more blended and hybrid teaching with more interactive sessions through games and simulation. Interestingly, the identified practices evidences in interviews of experts validated from students and faculty members responses.

5.1.3 People and Partners

The qualitative results showed the evidences of People Growth (Principle 9) through problem based (Sunder & Antony, 2018; Thomas et al., 2017; Doman, 2011) and interactive learning (Anthony & Antony, 2017; Rodger, 2010) in the classrooms. Additionally, the notable statement in qualitative results is connected and cooperative environment practice in LSHEIs for People Growth. Regarding Develop People (Principle 10), the practices of conceptual assessment of industrial problems, feedbacks on assessments and industrial experience during degree (Thomas et al., 2017; Emiliani, 2016) found in literature review and qualitative results. Further, the qualitative results revealed that the students get industrial exposure (trips, internship, or final year project) during degree to understand the application of the theoretical knowledge learned during the course, which expands their learning. The study conducted by (Thomas et al. (2017) inclined to qualitative findings of practicing HEIs and industry liaison for Partners Growth (Principle 11). It is encouraged to use shared resources between HEIs

(Comm & Mathaisel, 2005b). Students and faculty members validated the responses of experts. However, the student's number of responses was comparatively less in practices of problem solving method, industrial exposure, conceptual assessment and sponsored projects practice.

Continuous Improvement

5.1.4 The Continuous Improvement showed three Principles practices (Liker, 2004) in LSHEIs. The First See Situation (Principle 12) practices showed the evidences of formal and informal feedback in order to know perspectives of user of services. The studies conducted by Yorkstone (2019), Thomas et al. (2017), and Sunder (2016b) provided similar results of qualitative findings that continuous feedbacks are taken from students on learning experience and services. Further, the qualitative results highlighted that feedback on learning experience required in mid and at the end of semester. In addition, found the practice of informal feedbacks during semester from students to make improvement on on-going batch. The findings of Balzer et al. (2015) in line with the qualitative results that the faculty member's formal or informal feedback practiced for seeking areas of improvement, few responses also showed concerns on its formal practice in their HEIs. The qualitative findings showed astonishing finding that the LSHEIs also see situation through accreditation review process, as accreditations team also seek feedback of students. Sunder (2016b) and Tee (2015) postulated that the See Situation (Principle 12) practice also found through benchmarking other HEIs and comparing practices with other LSHEIs. The qualitative results are consistent with Rodger (2010), in which he demonstrated that the feedback from graduates is taken about their employment to see their learning application. Additionally, the qualitative results also showed that the HEIs (career cell) or department also ask employer about their graduates to See Situation.

The second Principle of Continuous Improvement is Decision By Consensus (Principle 13) encouraged students (Sunder & Antony, 2018; Doman, 2011) and faculty members (Balzer et al., 2015; Siddique et al., 2011) voice in decision making of different improvements, also validated from qualitative results. The informants in qualitative results highlighted that the students also involve in making decision of buying of any new equipment, need identified from their voice.

Regarding Learning Organisation CI (Principle 14), the literature (Yorkstone, 2019; Emiliani, 2016; Douglas et al., 2015) and qualitative results showed evidences of continuous improvement in all services. The qualitative results provided evidences of Thomas et al. (2017)

and Balzer et al. (2015) study that the professional development (up skilling, industry exposure and research opportunities) of faculty members contribute in Learning organisation CI. The qualitative results showed that faculty member's performance is evaluated for continuous improvement; i.e. teaching capability from students results, teaching, research, administrative skills, and impact in society.

5.2 Conclusion

Based on the research questions and the literature review, the three research objectives were articulated in this study. The main findings of this research are concluded in this section with reference to each research question.

RQ1. What are the LSHEIs practices in teaching processes and LSO?

The identification of the LSHEIs practices in teaching processes is supported by both primary and secondary data sources. The qualitative research phase is based on collecting primary data from experts, faculty members, and students. While in depth literature review findings are utilised in collecting primary data. The results identified 94 codes for LSHEIs practices and LSO, with 132 data items. The LSHEIs practices categorised under four Lean Principle Levels (Liker, 2004); i.e. Philosophy, Process, People and Partners and Continuous Improvement. The Principle Levels are comprised of fourteen principles; the practices are identified relevant to each principle in teaching processes in this research. In addition, it also familiarise the HEIs with their potential improvement areas.

5.3 Implications of Research

The discussion section showed consistency in qualitative results. This research has number of implications for academicians and for practitioners in Lean system. For academicians, it contributed to the body of knowledge, and for practitioners in Lean system had recommendations. This section presents theoretical, practical, and methodological implications of this research, respectively.

5.3.1 Theoretical Implications

Theoretically and empirically the LSHEIs practices are supported. Hence, this study contributes to the body of knowledge and it is summarised into following four aspects;

Firstly, the study embedded with Four Principle Levels comprised of Fourteen Lean Principles (Liker, 2004), and identified different practices evidenced in previous studies on LSHEIs

practices in teaching processes. Thus, this research adds to the existing body of knowledge on Lean system in HEIs (LSHEIs), its practices and its effect on LSO.

Secondly, the literature on Lean Principles and its practices is majorly covered in manufacturing industries context; hence, the validation of Lean system in HEIs context is another contribution of the study. As widely described in literature, the Lean system variables identified for HEIs are mostly studied in western context, the validation of Lean system in Malaysia context is performed in this research. Additionally, it corroborates that there is no difference in LSHEIs practices and it's LSO across different HEIs and departments.

Thirdly, this research identified LSHEIs practices, and results contributed literature on LSHEIs practices by validating previous studies. In the same vein, the research found evidences on the positive effect of LSHEIs practices on LSO thus validating the previous studies reporting Lean system practices in HEIs.

5.3.2 Practical Implications

It is the first study, conducted on Malaysia HEIs, which investigated LSHEIs-LSO relationship.

From the practical perspective, the results offer number of recommendations to practitioners. It is suggested to implement the LSHEIs practices in a holistic manner because all the Fourteen Principles practices are also mutually dependent and complement to each other. The ignorance to one practice possibly effect negatively on other practices. In other words, each practice is equally imperative in attaining LSO. Consequently, implementing LSHEIs practices in isolation or selected subsets could fail to get potential positive impact on HEIs processes, and potentially lead to unsuccessful implementation. Secondly, previous studies showed concerns on Lean system project based or short-term implementation in customised academic processes (i.e. curriculum) or mainly focused administrative processes in HEIs, this limited implementation led to its benefits decline. Thus, this research filled the gap found in previous study about Lean system holistic application in HEIs.

On basis of the results of the qualitative phase; if a HEI attempts to improve its LSO by implementing LSHEIs practices, then it should focus on the practices identified at four Principle Levels, namely Philosophy, Process, People and Partners, and Continuous Improvement.

The HEIs are recommended to affirm Philosophy Principle Level practices by setting long-term goals to add value in teaching processes and map practices accordingly. Secondly, the HEIs are also suggested to ensure practices identified at Process Principle Level by applying on both primary and secondary teaching processes. It is important to understand, differentiate,

and streamline primary and secondary processes. These processes follow the practices categorised into the principles of create flow, Use Pull, level workload, eliminating rework, standardisation, visual management, and technology.

In terms of People and Partners Principle Level, HEIs are advised to warrant growth and development of people (internal) and partners (external) of institution. Internally, people growth and development should be streamlined through interactive learning, problem based learning, conceptual assessments and feedbacks on assessments, which expand their learning. Secondly, externally partner's growth ensured through working and effective liaison with industries and other institutes.

Lastly, the HEIs are suggested with Continuous Improvement Principle Level through See Situation, Decisions by Consensus and Learning Organisation CI principles practices. The See Situation ensured with feedbacks; recommended to make improvement decisions by consensus of students and faculty members; involving them in improvement process is preferable; and lastly become continuous learning organisation and target perfection.

At last, this research provides guideline on practices of Lean system in HEIs for academic, administrative staffs and practitioners all over the world. It also highlighted the potential benefits if LSHEIs practices followed carefully and target oriented. This research will be of interest to students, being a most important stakeholder, first they experience the improved teaching process and learning opportunities through LSHEIs practices. Additionally, the accreditation bodies may use these LSHEIs practices to recommend HEIs to improve particularly in these directions. Most importantly, it is hoped that the viewpoint and suggestions will provide HEIs staff and practitioners in driving their institutes towards more competitive and sustainable. They will actively support LSHEIs practices and find potential areas to improve processes add value, reduce waste and positive cultural change.

5.4 Limitations and Future Perspective

The researches always found with some limitations, and it is applicable in the case of this research. This section will unveil the limitations of this research and provide directions for future research. The benefits of mentioning limitations is to consider these limitations while interpreting research findings, and it also should be considered while taking actions from its outcomes.

Firstly, the research design chosen is cross-sectional, which is due to limited resources (time and budget) constraints. The data is collected once in this research and just presents picture of single point of time, instead of assessing changes over time. From the literature review, it

is found that Lean system requires long-term commitment, and in short term it is harder to view benefits explicitly. For future research, it is recommended to design longitudinal study in which sees effect of LSHEIs on LSO in long term, which also assesses changes over time and not rely on single point of time.

Secondly, different stakeholder's opinions, experiences and expectations are different towards Lean system, i.e. faculty member, student, administrative staff, industry advisor roles are different. Even though in this research, the informants of qualitative phase were faculty members, students and experts. Undoubtedly, it would be better to seek responses equally from all other HEIs stakeholders.

Lastly, in qualitative phase the interviews were conducted from experts of Lean system from worldwide. In addition to this, in Malaysia the case of UNMC is taken in which informants were faculty members and students. The practices of Lean system vary across HEIs. Therefore, multiple cases showed are considered to compare cross campus practices or interviews from other HEIs could be more valuable to view comprehensive picture.

5.5 Concluding Remarks

This research contributes towards the concept of Lean system adoption in teaching process of HEIs through LSHEIs practices. The LSHEIs practices are considered at four Principle Levels, comprised of fourteen principles with defined relevant practices in it. The findings of this research underscore the potential effect of LSHEIs practices on LSO. It emphasised holistic and continuous application of all principles and practices to gain potential benefits. Hence, the level of LSHEIs practices implementation is higher, the LSO is also higher.

The findings of the research presents comprehensive and in depth view of prior studies examining Lean system practices in HEIs. Confidently, this research provides a stepping-stone to deal with HEIs issues and challenges in the developing countries like Malaysia. It also ensures theoretical and practical contribution to the HEIs throughout the world to compete globally and sustain.

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Appendices

Appendix A: HEIs in Malaysia

Public Universities	Private Universities	Private Universities-Foreign Campus
1. *University of Malaya* 2. Universiti Sains Malaysia (USM) 3. Universiti Kebangsaan Malaysia (UKM) *The National University of Malaysia* 4. Universiti Putra Malaysia (UPM) 5. Universiti Teknologi Malaysia (UTM) 6. Universiti Islam Antarabangsa Malaysia (UIAM) *International Islamic University Malaysia* 7. Universiti Utara Malaysia (UUM) 8. Universiti Malaysia Sarawak (UNIMAS) 9. Universiti Malaysia Sabah (UMS) 10. Universiti Pendidikan Sultan Idris (UPSI) *Sultan Idris Education University* 11. Universiti Sains Islam Malaysia (USIM) *Islamic Science University of Malaysia* 12. Universiti Teknologi MARA (UITM) 13. Universiti Malaysia Terengganu (UMT) 14. Universiti Tun Hussein Onn Malaysia (UTHM) 15. Universiti Teknikal Malaysia Melaka (UTEM) 16. Universiti Malaysia Pahang (UMP) 17. Universiti Malaysia PERLIS (UniMAP) 18. Universiti Sultan Zainal Abidin (UNISZA) 19. Universiti Malaysia Kelantan (UMK) 20. Universiti Pertahanan Nasional Malaysia (UPNM)	1. Al-Madinah International University (MEDIU) 2. Asia e University (AeU) 3. Asia Pacific University of Technology and Innovation (Asia Pasific UTI) 4. Asia School Of Business (ASB) 5. Binary University of Management and Entrepreneurship (BUME) 6. City University 7. DRB-HICOM University Of Automotive Malaysia 8. GlobalNxt University 9. International Centre for Education in Islamic Finance (INCEIF) 10. International Medical University (IMU) 11. International University of Malaya Wales (IUMW) 12. Malaysia University of Science and Technology (MUST) 13. Malaysia Institute For Supply Chain Innovation (MISI) 14. Management and Science University (MSU) 15. Manipal International University 16. Meritus University 17. Perdana University 18. Putra Business School(PBS) 19. Quest International University Perak 20. Raffles University Iskandar 21. Sunway University 22. UNITAR International University 23. Universiti AIMST (AIMST University) 24. Universiti Antarabangsa Albukhary (Albukhary International University) 25. Universiti Antarabangsa INTI (INTI International University) 26. Universiti HELP 27. Universiti Infrastruktur Kuala Lumpur 28. Universiti Islam Malaysia 29. Universiti Kuala Lumpur (UniKL) 30. Universiti MAHSA (MAHSA University) 31. Universiti Metropolitan Asia (Asia Metropolitan University) 32. Universiti Multimedia, Kampus Cyberjaya (Multimedia University, Cyberjaya Campus) 33. Universiti Nilai 34. Universiti SEGi (SEGi University) 35. Universiti Selangor (UNISEL) 36. Universiti Sultan Azlan Shah (USAS) 37. Universiti Taylor's (Taylor's University)	1. Heriot-Watt University Malaysia (UK) 2. Monash University (Australia), 3. Curtin University (Australia), 4. Newcastle University School of Medicine (UK) 5. University of Southampton (UK). 6. Swinburne University of Technology Sarawak Campus (Australia) 7. University of Nottingham Malaysia Campus (UK) 8. Xiamen University Malaysia Campus 9. University of Reading 10. Royal College of Surgeons In Ireland And University College Dublin Malaysia Campus (Ireland)

Public Universities	Private Universities	Private Universities-Foreign Campus
	38. Universiti Teknologi Kreatif Limkokwing (LUCT) 39. Universiti Teknologi Petronas (UTP) 40. Universiti Tenaga Nasional Kampus Putrajaya (UNITEN) Kampus Putrajaya) 41. Universiti Terbuka Malaysia (UNITEM) (Open University Malaysia (OUM) 42. Universiti Terbuka Wawasan (WOU) 43. Universiti Tun Abdul Razak (UNIRAZAK) 44. Universiti Tunku Abdul Rahman (UTAR) 45. Universiti UCSI (UCSI University) 46. University Malaysia of Computer Science and Engineering (Universiti Malaysia Sains Komputer dan Kejuruteraan) 47. First City University College 48. KDU University College 49. Kolej Universiti Agrosains Malaysia 50. Kolej Universiti Bestari (University College Bestari) 51. Kolej Universiti Borneo Utara (KUBU) 52. North Borneo University College (NBUC) 53. Kolej Universiti Fairview 54. Kolej Universiti Geomatika 55. Kolej Universiti Hospitaliti Berjaya 56. Kolej Universiti INSANIAH (KUIN) 57. Kolej Universiti Islam Antarabangsa Selangor (KUIS) 58. Kolej Universiti Islam Melaka (KUIM) 59. Kolej Universiti Islam Pahang Sultan Ahmad Shah (KUIPSAS) 60. Kolej Universiti Islam Perlis 61. Kolej Universiti Islam Sains dan Teknologi (KUIST) (Islamic University College of Science and Technology (IUCST)) 62. Kolej Universiti KDU Penang 63. Kolej Universiti KPJ Healthcare (KPJ Healthcare University College) 64. Kolej Universiti Lincoln 65. Kolej Universiti Linton (Linton University College) 66. Kolej Universiti New Era 67. Kolej Universiti Poly-Tech MARA Kuala Lumpur (KUPTM) 68. Kolej Universiti Sains Perubatan Cyberjaya (CUCMS) 69. Kolej Universiti TATI 70. Kolej Universiti Teknologi Antarabangsa Twintech (TWINTECH), Kampus Kelantan 71. Kolej Universiti Teknologi Sarawak (University College of Technology Sarawak)	

Public Universities	Private Universities	Private Universities-Foreign Campus
	72. Kolej Universiti Tunku Abdul Rahman Kampus Cawangan Johor 73. Kolej Universiti Widad (Widad University College) 74. Kolej Universiti Yayasan Sabah (KUYS) (University College Sabah Foundation (UCSF) 75. Kolej Universiti Selatan (Southern University College) 76. Kuala Lumpur Metropolitan University College (KLMUC) 77. Veritas University College 78. Kolej Universiti Saito 79. Kolej Universiti Komunikasi Han Chiang 80. Kolej Universiti Genovasi (Genovasi University College)	

Source: Author (Information from Ministry of Higher Education Malaysia)

Appendix B: Informant Information Sheet and Consent Form

Appendix B.1: Interview Information Sheet

INFORMANT INFORMATION SHEET

Title: Study of Lean System Higher Education Institutions (LSHEIs) practices and Lean System Outcome (LSO).

You are invited to participate in this research on Lean system in Higher Education Institutes. Whether or not you take part is your choice. If you don't want to take part, you don't have to give a reason, and it won't affect the care you receive. If you do want to take part now, but change your mind later, you can pull out of the study at any time.

This Informant Information Sheet will help you decide if you'd like to take part. It sets out why I am doing the study, what your participation would involve, what the benefits and risks to you might be, and what would happen after the study ends. I will go through this information with you and answer any questions you may have. You do not have to decide today whether or not you will participate in this study. Before you decide you may want to talk about the study with other people, such as family, friends, and mentor. Feel free to do this. If you agree to take part in this study, you will be asked to sign the Consent Form on the last page of this document. You will be given a copy of both the Informant Information Sheet and the Consent Form to keep.

Research Introduction:

This research is about Lean system, which is found as one of the best practices to improve manufacturing industries by focusing its value adding activities and waste elimination. There are many success stories of Lean system in industries and also evaluated in few service sectors like administration process, healthcare, construction, insurance etc. Many Higher education Institutes are still following traditional methods and techniques of teaching and administration, and past concepts instead of adopting new improvement techniques in their system. Researchers are working to find ways to improve quality of education and system, and developing solutions to evaluate performance of this service sector.

Purpose of the study:

This research is aimed to study the Lean System Higher Education Institutions (LSHEIs) practices and Lean System Outcome (LSO). It investigates the practices of Lean 14 Principles (Likers, 2004) in HEIs. This research will contribute towards the continuous improvement of institutes.

Reason you invited to participate:

The researcher has chosen faculty members and students for interviews in order to view their perspective and experience of Lean system in Higher Education Institutions. The targeted respondents are faculty members and students of University of Nottingham Malaysia campus and in addition to these experts of Lean system in HEIs, including Lean practitioners. Their valuable opinion and experience will help to map practices of Lean system HEIs practices.

Benefit and risks to participant:

The faculty members and students are the most important stakeholders of Higher Education Institutions. Their experience and suggestions are very important to analyse and improve Lean system in Higher education. I cannot promise the study will help you but the information I will get from the study will help to increase the understanding of Lean system in Higher Education Institutions and in long term benefit you after recognition.

Participation in the research is completely voluntary, that participants are at liberty to withdraw at any time without prejudice or negative consequences, that non-participation will not affect an individual's rights/access to other services/care.

Confidentiality of Participant

All information you provide to me will be kept confidential. Under no circumstances will identifiable responses be provided to any other third party. Information emanating from the analysis will only be made public in a completely at the aggregate level. We must however inform you that if you disclose information that may result in you or anyone else being put at risk of harm we may have to inform the appropriate authorities. If this situation arises we will discuss all possible options for ourselves and you before deciding whether or not to take any action. The participant interview will be audio recorded, just to use it at analysis time. The audio record will be kept confidential.

Information provided by Participant

All information provided by you will be stored anonymously on a computer with analysis of the information obtained undertaken by the research. The results from this analysis will be available in one or more of the following sources; scientific papers in peer reviewed academic journals; presentations at a regional conference; local seminars, Postgraduate Thesis records.

Thank you for reading this information sheet and for considering taking part in this research.

Researcher:
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Appendix B.2: Consent Form

CONSENT FORM

Thank you for considering taking part in this research. The person organising the research must explain the project to you before you agree to take part. If you have any questions arising from the Information Sheet or explanation already given to you, please ask the researcher before you decide whether to join in. You will be given a copy of this Consent Form to keep and refer to at any time. To be completed by the participant.

Title: Study of Lean System Higher Education Institutions (LSHEIs) practices and Lean System Outcome (LSO).
I confirm that I understand and by not giving consent for any one element I may be deemed ineligible for the study. • I have been informed of and understand the purposes of the study. • I have been given an opportunity to ask questions. • I understand I can withdraw at any time without prejudice. • Any information which might potentially identify me will not be used in published material. • I agree to participate in the study as outlined to me. • I consent to my interview being audio/video recorded. • I would be potentially identifiable in any published material Yes? ☐ No? ☐

Signed (Informant)	Date
Name in block letters	
Signature of researcher	Date
Supervisor: Dr. Christina Chin	
Researcher's contact details: Email: imnedian246_44@hotmail.com Contact no.: +923360876919	

Appendix C: Interview Protocol

Appendix C.1: Interview Protocol with Lean Expert/ Practitioner/ Faculty member in Lean HEIs

INTERVIEW PROTOCOL			
Research Title: Study of Lean System Higher Education Practices and Lean System Outcome **Researcher:** Mariam Altaf Tarar **Research Question:** What are the LSHEIs practices in teaching processes and Lean System Outcomes (LSO)? **Informant:** Expert / Faculty member			
SECTION I			
Interviewee name: **Affiliation:** **Designation:** **Date and time:** **Duration:** **Method of interview:** **Location:**			
SECTION II			
Semi-structured Interview Questions			
Sr. no.	**Theory Question**	**Lean Principle Category**	**Interview Questions**
1.	**What are the LSHEIs practices at Philosophy Principle Level?**	**Philosophy**	**Principle 1: Long Term Philosophy** What is the long-term philosophy of teaching processes in HEIs? • What are the ways through which HEIs understand accomplishment of long term goals?

			• What are the HEIs long term goals? • How do HEIs committed to add value?
2.	**What are the LSHEIs practices at Process Principle Level?**	**Process**	What are the practices to smoothly perform teaching processes in HEIs? **Principle 2: Create Flow** What are the ways to 'Create Flow' in HEIs teaching processes? • What are the resources necessarily required to streamline teaching process? • How do teaching methodologies differentiate in Lean HEIs? • How do different supporting facilities of teaching process work efficiently? **Principle 3: Use Pull** How do HEIs bring 'Use Pull' approach in teaching processes? • What are the ways to address customer needs in teaching process? • How does curriculum meet needs of students and industry? **Principle 4: Levelled Workload** How do HEIs level workload of all resources? • How do HEIs balance the workload of faculty member? • Do HEIs ensure availability of facilities when needed?

			Principle 5: Eliminate Rework What are the HEIs practices to avoid unnecessary tasks, reworks, errors or waste? • What kind of reworks involved in teaching process? • How do HEIs control reworks in teaching process? **Principle 6: Standardisation** How do HEIs ensure 'standardisation' in teaching process? • How do HEIs define standards, internally and externally? • Do HEIs have defined Standard Operating Procedures (SOPs)? • What is a role of accreditation bodies in standardisation of HEIs teaching process? **Principle 7: Visual Management** What are the practices to adopt 'Visual Management' in HEIs teaching process? **Principle 8: Technology** What are the practices regarding advance technology use in HEIs teaching process? • How does teaching process improved with technology use? • How do HEIs disseminate information efficiently?
3.	**What are the LSHEIs practices at People and**	**People and Partners**	**Principle 9: People Growth** What are the ways to have 'People Growth' through teaching process in HEIs?

	Partners Principle Level?		• How does faculty member ensure student growth in teaching process? • How lectures are made effective to positively impact on growth of students? **Principle 10: Develop People** How do HEIs 'Develop People' and make them exceptional? • What are additional tasks performed by HEIs, other than effective lectures, to develop student as an exceptional resources? • What are the ways and means for students' field exposure or learn field experiences? • How does teaching assessments made different from traditional practices? **Principle 11: Partners Growth** What are the practices to have 'Partners Growth' in HEIs? • How do HEIs build liaison with industries? • What is a role of industrial liaison in teaching process in HEIs? • How do HEIs improve collaboration with other HEIs?
4.	**What are the LSHEIs practices at Continuous Improvement Principle Level?**	**Continuous Improvement**	What are Continuous Improvement practices?

			Principle 12: See Situation What are the practices to see situation in HEIs? • How do HEIs see actual situation and monitor system? • What is a role of feedback system in HEIs? • What are the formal and informal feedback practices? **Principle 13: Decision by Consensus** What are the practices to develop consensus in improvement decision? • Do HEIs take students input in improvements? **Principle 14: Learning Organisation CI** What are the practices to build in continuous improvement in HEIs? • Do HEIs continuously find the area of improvements? • How do faculty member and student continuous improve in HEIs?
5.	**Lean system Outcome** **What is the Lean System Outcome (LSO) of Lean System Higher Education Institutions (LSHEIs) practices?**		What are observable changes in HEIs as a result of following improvement programs (e.g. Lean system)? • Do you think Lean system is a contributing element to HEIs practices? Why? • How do Lean HEIs different from traditional HEIs?

Appendix C.2: Interview Protocol with Student in Lean HEIs

INTERVIEW PROTOCOL

Research Title: Study of Lean System Higher Education Practices and Lean System Outcome

Researcher: Mariam Altaf Tarar

Research Question: What are the LSHEIs practices in teaching processes and Lean System Outcomes (LSO)?

Informant: Students

SECTION I

Interviewee name:

Department: **Year of Study:**

Date and time: **Duration:**

Method of interview:

Location:

SECTION II

Semi-structured Interview Questions

Sr. no.	Theory Question	Lean Principle Category	Interview Questions
1.	**What are the LSHEIs practices at Philosophy Principle Level?**	**Philosophy**	**Principle 1: Long Term Philosophy** What is the long term philosophy of teaching processes in HEIs? • What are the ways through which HEIs understand accomplishment of long term goals? • What are the HEIs long term goals? • How do HEIs committed to add value?

2.	**What are the LSHEIs practices at Process Principle Level?**	**Process**	What are the practices to smoothly perform teaching processes in HEIs? **Principle 2: Create Flow** What are the ways to 'Create Flow' in HEIs teaching processes? • What are the resources necessarily required to stream line teaching process? • How do teaching methodologies differentiate in Lean HEIs? • How do different supporting facilities of teaching process work efficiently? **Principle 3: Use Pull** How do HEIs bring 'Use Pull' approach in teaching processes? • What are the ways to address customer needs in teaching process? • How does curriculum meet needs of students and industry? **Principle 4: Levelled Workload** How do HEIs level workload of all resources? • How do HEIs balance the workload of students? • Do HEIs ensure availability of facilities when needed? **Principle 5: Eliminate Rework** What are the HEIs practices to avoid unnecessary tasks, reworks, errors or waste?

			• What kind of reworks involved in teaching process? • How do HEIs control reworks in teaching process? **Principle 6: Standardisation** How do HEIs ensure 'standardisation' in teaching process? • How do HEIs define standards, internally and externally? • Do HEIs have defined Standard Operating Procedures (SOPs)? • What is a role of accreditation bodies in standardisation of HEIs teaching process? **Principle 7: Visual Management** What are the practices to adopt 'Visual Management' in HEIs teaching process? **Principle 8: Technology** What are the practices regarding advance technology use in HEIs teaching process? • How does teaching process improved with technology use? • How do HEIs disseminate information efficiently?
3.	**What are the LSHEIs practices at People and Partners Principle Level?**	**People and Partners**	**Principle 9: People Growth** What are the ways to have 'People Growth' through teaching process in HEIs? • How does faculty member ensure student growth in teaching process?

			• How lectures are made effective to positively impact on growth of students? **Principle 10: Develop People** How do HEIs 'Develop People' and make them exceptional? • What are additional tasks performed by HEIs, other than effective lectures, to develop student as an exceptional resources? • What are the ways and means for students' field exposure or learn field experiences? • How does teaching assessments made different from traditional practices? **Principle 11: Partners Growth** What are the practices to have 'Partners Growth' in HEIs? • How do HEIs build liaison with industries? • What is a role of industrial liaison in teaching process in HEIs? • How do HEIs improve collaboration with other HEIs?
4.	**What are the LSHEIs practices at Continuous Improvement Principle Level?**	**Continuous Improvement**	What are Continuous Improvement practices? **Principle 12: See Situation** What are the practices to see situation in HEIs?

			• How do HEIs see actual situation and monitor system? • What is a role of feedback system in HEIs? • What are the formal and informal feedback practices? **Principle 13: Decision by Consensus** What are the practices to develop consensus in improvement decision? • Do HEIs take students input in improvements? **Principle 14: Learning Organisation CI** What are the practices to build in continuous improvement in HEIs? • Do HEIs continuously find the area of improvements? • How do faculty member and student continuous improve in HEIs?
5.	**Lean system Outcome** **What is the Lean System Outcome (LSO) of Lean System Higher Education Institutions (LSHEIs) practices?**		What are observable changes in HEIs as a result of following improvement programs (e.g. Lean system)? • Do you think Lean system is a contributing element to HEIs practices? Why? • How do Lean HEIs different from traditional HEIs?

Appendix D: Interview Invitation Letter

Dear Sir/Madam,

I am Mariam, PhD student in Mechanical engineering department at University of Nottingham Malaysia Campus (UNMC), and doing my research on Lean System Higher Education Institutions practices. I am conducting interviews as part of a research study to increase my understanding of Higher Education Institutions practices regarding Lean system. As an Expert / practitioner / Faculty member, you are in an ideal position to give me valuable first hand information from your own perspective and experience. Your interview is very important for my research. The interview takes around 30 minutes and is very informal. I will get in touch with you through telephone or Skype or face to face, as per your convenience. I am simply trying to capture your thoughts and perspectives on Lean System Higher Education Institutions practices and its outcomes. Your responses to the questions will be kept confidential. The confidentiality of each informant identification will be strictly considered and ensure that personal identifiers are not revealed during the analysis and write up of findings. There is no compensation for participating in this study. However, your participation will be a valuable addition to my research and findings could lead to greater understanding of Lean System Higher Education Institutions practices. If you are willing to participate, please suggest a day and time, that suits you and I will do my best to be available. If you have any questions please do not hesitate to ask. Thanks!

Thanks and Regards,

Mariam Altaf Tarar

Research Assistant
Faculty of Mechanical, Materials and Manufacturing Engineering
University of Nottingham Malaysia Campus

Email: Kedx4maa@nottingham.edu.my

Telephone:+92 (336) 0876919

Name of the experiment:

Study of Lean System Higher Education Institutions practices and Lean System Outcome

Application ID to SEREC (Science and Engineering Research Ethics Committee):

MAT281215

Description of the study (max 100 words):

This research is about Lean system, which is found as one of the best practices to improve manufacturing industries by focusing its value adding activities and waste elimination. Researcher is working to find ways to improve quality of education system, and developing solutions to evaluate performance of this service sector through Lean system.

Name of the researcher and/or supervisor:

Ms Mariam Altaf Tarar

Dr Christina Chin (Supervisor)

Inclusion and exclusion criterion for participation:

Inclusion: Students at University of Nottingham Malaysia campus

Compensation (if any):

Not applicable

How to participate (link or contact details):

Interested participants can contact and inform their interview appointment on any of the following id;

Email: kedx4maa@exmail.nottingham.edu.my

Contact #: +923360876919

Skype id: mariamaltaftarar

Appendix E: Interview Transcription

(Informant: Faculty M)

Interviewer:

What are the HEIs long term goals? What are the ways through which HEIs understand accomplishment of long term goals?

Informant:

Usually we have defined program outcomes to know which values will be targeted in graduates throughout their studies. Every student when walks in the first year they know what will program outcome and they are guided on set outcomes. Our long term goals are to actually make them learned different skills targeted in program outcomes. As a teacher, we do our best in terms of delivering the module so that we fulfil our ultimate program outcomes. We actually train our students on coursework with practical knowledge and even encouraging them to explore more through research. Most importantly, students learn soft skills desired to face different challenges in practically life. In fact, HEIs long term goals and its strategies based on student value adding of different skills desired in professional life.

Interviewer:

How do HEIs committed to add value?

Informant:

Most of undergraduate engineering students enrolled with basic knowledge of science and technology. We (teachers) taught them with field related in-depth knowledge and practical skills, while university experience they also learn moral values and skills to face challenges in practical life. In addition to lectures, various methods used to add value, for example practical labs, field exposure, etc. I believe these altogether add value in our students. Teacher role and commitment is important in fulfilling and delivering these values in students.

Interviewer:

What are the ways to ‘Create Flow’ in HEIs teaching processes?

Informant:

First and most importantly trained teachers play vital role, how they deliver knowledge inside the classrooms and students learn different skills aimed in program outcomes. Then second one their accessibility outside the classrooms, even through email and networking provided.

Other than this, all the facilities required to fulfil teaching tasks are provided and working when required. Labs are well equipped, maintained and developed. If any new equipment required it preferably procured.

Interviewer:

What are the resources necessarily required to stream line teaching process?

Informant:

I think all human and non-human resources are here to streamline HEIs process.

Interviewer:

How do teaching methodologies differentiate in Lean HEIs?

Informant:

Teaching capability is considered most important here and teachers learn advance teaching methodologies to teach effectively. Teachers streamline teaching process with various teaching methodologies which effectively deliver particular concept. For example, in certain modules if lab work is essential to strengthen concepts then included, or case studies desired to understand application then made part of teaching methodology.

Interviewer:

How do different supporting facilities of teaching process work efficiently?

Informant:

For example if lab work is required in any module, then required labs are accessible, well equipped and maintained for undergraduates. Every individual student can perform experiment, and these are well scheduled to manage and value time of students and teachers. Further, it is also required to improve practice of regular maintenance to avoid any breakdown.

Interviewer:

How do HEIs bring ‘Use Pull’ approach in teaching processes? What are the ways to address customer needs in teaching process?

Informant:

Now students are focused in universities, and it is streamlined to meet their needs and satisfaction level. The teachers make sure to deliver the knowledge also aligned with industry requirement and students expectation. In fact the HEIs became student centric and aiming to satisfy them is bottom line. In universities, 'Use Pull' or meeting customer needs are like that.

Interviewer:

How does curriculum meet needs of students and industry?

Informant:

Curriculum designing is based on all advanced content related to particular field and which is required by job market (industries). Our curriculum is standardised for five years and defined by UK campus. But whenever we see some changes input from students or even industries, then we try our best to fulfil their needs. We also have industry advisory board and their members play positive role if require changes in curriculum.

Interviewer:

How do HEIs level workload of all resources? How do HEIs balance the workload of faculty members?

Informant:

As already discussed that whatever facilities required by teacher or students in teaching process are made available on preference. Everything carefully planned and scheduled earlier to avoid any in inconvenience. The scheduling ensures proper and balanced time utilisation of student, teachers and other facilities like classroom, labs or other. Workload of teachers is also critically balanced and emphasised them to efficiently transfer knowledge. Usually head of the department (HoD) allocate modules to the teachers as per their expertise and workload.

Interviewer:

What are the HEIs practices to avoid unnecessary tasks, reworks, errors or waste? How do HEIs control reworks in teaching process?

Informant:

I think Nottingham is actually doing a lot for student experience and how to improve student personalities. We have put lot of effort in student support, their wellbeing and even disability support, to ensure they perform well.

Interviewer:

What kind of reworks involved in teaching process?

Informant:

If you see case of curriculum, repletion of contents are sometime unnecessary and it also loose student's interest in learning. Such reworks are here rectified to become effective.

Interviewer:

How do HEIs ensure 'standardisation' in teaching process?

Informant:

If you want to look at undergraduate here in Nottingham then you will see that quality manuals are defined with standard operating procedures are followed. We have defined objectives and outcomes, which targeted throughout the teaching process. Standards are defined and followed in all services and process involved in it. Actually we have defined outcome of the product (student), which are the certain qualities (skills) that are taught to fulfil the program outcome. The teaching deliveries and methods are outlined, however teaching styles are made bit flexible, up to teachers as per the module requirement. When we have assessments actually we assess the student learning. If we see that any student is not doing well in any particular objective, then measures taken to improve that. By assessment we reciprocate if find gap in achieving objectives. Right!

Interviewer:

How do HEIs define standards, internally and externally?

Informant:

In curriculum you see we follow standardised UK curriculum and their system. Here we follow international curriculum and standards which are actually good comparatively among other universities. We are following European curriculum, I believe it is bit more advance and better among other Asian universities. Our objectives and our deliverables are actually shared from UK and China so this is pre-set.

Interviewer:

What are the practices to adopt ‘Visual Management’ in HEIs teaching process?

Informant:

Usually display information on boards so student easily knowhow about any information important for them. In addition, all important news and information is available on university website or emailed to students .

Interviewer:

What are the practices regarding advance technology use in HEIs teaching process?

How does teaching process improved with technology use?

Informant:

Classrooms are equipped with advance technology and teachers also use blended learning if required. Advance technology made teaching process more efficient and effective.

Interviewer:

How do HEIs disseminate information efficiently?

Informant:

As discussed earlier that email and networking is very active for everyone, and it made dissemination of information efficient. Students can access teachers or administrative staff easily. University has norms to respect and respond each query. Students have Moodle accounts and access knowledge easily.

Interviewer:

What are the ways to have ‘People Growth’ through teaching process in HEIs?

Informant:

I believed that our students learning experience here make them grow their skills, teaching is made effective with practical knowledge, real life problems and problem based learning. All such efforts contribute in their growth.

Interviewer:

How lectures are made effective to positively impact on growth of students?

Informant:

In fact lectures are main source to add value in students. Teachers make it more interactive to make effective. The class environment is friendly to openly discuss concepts and queries. I think it is two way learning. Overall university administration is supportive in all services.

Interviewer:

What are additional tasks performed by HEIs, other than effective lectures, to develop student as an exceptional resources?

Informant:

There are various methods like field trips, talks, different activities, presentations and we also have industrial exposure like internship and final year projects.

Interviewer:

What are the ways and means for students' field exposure or learn field experiences?

Informant:

Students experience an internship in industries in mid of their degree. Actually we send them in industries so when they face industries they actually learn how theoretical knowledge practically applied in industries, and what actually happens. Usually student spends two months or even in some cases its six months, depends on student and industry. Industrial representative engage them in different activities to learn them industrial problems.

In fourth year they have final year project. Mostly the final year projects are industry based and depends on student interest and selection. The performance of students assessed by internal and external (i.e. internal supervisor and industrial supervisor).

Interviewer:

How does teaching assessments made different from traditional practices?

Informant:

In actual the assessments based to application of concepts and practical problems, to confirm development of desired level of learning. Further gaps in performance analysed and students guided on improvements.

Interviewer:

What are the practices to have ‘Partners Growth’ in HEIs?

Informant:

Our partners are industries and various other universities, and liaison between us benefits both bodies. If our students perform internship there then they get practical exposure, on other side industries also get benefit by resolving industrial problems through young brains.

Interviewer:

How do HEIs build liaison with industries? What is a role of industrial liaison in teaching process in HEIs?

Informant:

There is university representative who is actually in charge of industry relations. We have industry advisory board. Industry advisory board plays role in arranging internship, projects, field trips, talks, research sponsorship, curriculum revisions, etc. Students or teachers also voluntarily arrange such industrial exposures. Both options are open.

Interviewer:

How do HEIs improve collaboration with other HEIs?

Informant:

Experts from other campuses deliver different talks here, we arrange guest lectures. On other hand, resources are also shared with other universities or centres, either laboratories or research related if required for students. It’s sometime economical too. Right!

Interviewer:

What are the practices to see situation in HEIs? How do HEIs see actual situation and monitor system?

Informant:

As we are student centric so we see actual situation by knowing student perception. The main source is a feedback of students because they are the product. Right! This is living product. This product actually gives you good feedback or not. For that purpose we have survey for Student Evaluation for Teaching (SET) and Student Evaluation for Module (SEM). External body evaluate such survey on annual base. We monitor student experience and perspective

from first year until the final year through their participation in survey. we see how we delivered and satisfy students, so the student actually telling us their satisfaction level. If we find grey areas in it then we have action plan for this feedback. We conduct feedback on other administrative services too.

Interviewer:

What are the formal and informal feedback practices?

Informant:

Formal feedbacks are SET and SEM. In informal feedbacks, meetings or events help to understand student's perspective.

Interviewer:

What are the practices to develop consensus in improvement decision? Do HEIs take students inputs in improvements?

Informant:

Let me discuss with example, if feedback evaluation shows students concerns and dissatisfaction on any practice. Then we all have meetings, and decide what is suitable solution to resolve matter. Even we monitor it in next evaluation whether be the student satisfies in terms of the mode of feedback how it goes. By doing this we actually improving teaching experience (the method of teaching). It also helps to involve students in improvements, and consensus also developed for decision. In this way everyone has opportunity to puts their input in improvement. Now in recent years, feedback evaluation actually shows that now teaching evaluation also moving up and student's satisfaction level is increased.

Other than annual feedbacks, student can meet anytime with teachers regarding their complains or concerns. Even in developing laboratories, students input are taken.

Interviewer:

What are the practices to built-in continuous improvement in HEIs?

Informant:

We continuously monitor performance of academic and administrative tasks, and make continuous improvements wherever required.

Interviewer:

How do faculty member and student continuous improve in HEIs?

Informant:

We have teacher's trainings to improve teaching skills, as our main focus in improving teaching capability. We also have specific department for professional development, which actually guide the teachers on teaching skills; how can they monitor their teaching? how can they move forward? What are the areas of improvement? What are the methods of teaching? How will they evaluated? How can they professionally develop and grow?

Teachers have national and international opportunities to present or collaborate on research and teaching depends on the department budget, it helps in their continuous learning. Teacher annual evaluation also motivates them to continuously improve. (You know) Unless you measure you never know how you performing and how much potential to improve.

University evaluate teacher's academic, administrative and research works, like evaluated through feedbacks. Teachers continuously improve teaching skills which ultimately improves students learning. Students have assigned advisors, who actually advise them on performance, exam and other learning opportunities. Advisors continuously guide them in improving their performance, highlight how they are lacking in terms of their learning or grades.

Interviewer:

What are observable changes in HEIs as a result of following improvement programs (e.g. Lean system)? How do Lean HEIs different from traditional HEIs?

Informant:

You would see actually our graduates are one of being the highest employed and highest paid among other universities in Malaysia. I mean I am talking in contest of Malaysia. You can clearly see this we have statistics from the career team. It is one of the most important aspect which shows worth of our product and their market demand. Internally, different changes are made like student targeted to be satisfied; students are motivated, and promoted culture of respect in university. Actually the student satisfaction and learning is worth doing.

If you see at operational levels, then system is efficient, responsive and minimise wastes which ultimately save resources.

Actually Nottingham is leading in way of international campus in Malaysia. Everyone was seeing whether it successfully works or not. But it grew and improved so now others also

opened their international campuses here. Malaysia is beautiful country, ethnicity respected, and low cost too. So it's just making people willing to come, so now we have more competition. When we were first who opened our campus here, we had only one international campus, many enrolled and preferred here. Now people have options whether they go University of Reading, University of Southampton, Curtin University, Monash university or other international campuses. Now campuses have competitive race.