

Lean Management in Higher Educational Institutions: A Systematic Literature Review

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Abstract

Higher Education Institutions are no different from corporates. There is a relentless pressure to perform and improvise from all facades of stake-holders. Elimination and management of non-value-added activities might be of aid in developing a lean system for the said purpose. The present study provides a systematic literature review to explore the pervasiveness of Lean management and its principles in Higher Education Institutions. Prisma framework has been used for the present systematic study. Ebsco database has been used for the purpose of conducting the study on 9 published research papers during 2014-2024 after systematic inclusion and exclusion of 29,552 records initially retrieved using the key words “lean”, “higher education”, “college”, “University”, “Higher Education Institutions” using Boolean operator AND and OR appropriately. A descriptive analysis on the 9 papers was done to assess details of the works studied and the contribution to the body of knowledge and literature. The study revealed a positive impact of lean management in Higher Educations Institutions in management of waste and its elimination. The study also highlights limitations and directions for future research.

Keywords: Lean Management, Higher Education, Prisma framework.

Introduction

Lean Management constitutes a prescriptive framework originating from the Toyota Production System, emphasizing the identification of processes that contribute value while simultaneously eradicating non-value-added activities; this dual focus leads to the minimization of waste and the enhancement of overall performance. This paradigm represents an ongoing practice aimed at augmenting efficiency, productivity, and quality through systematic improvements. Lean management is encapsulated within five foundational principles.

1. Value: Value is the package that distinguishes an order qualifier to an order winner from the client’s perception, thereby addressing the diverse needs of the client and promises to fulfil those.
2. Value stream mapping: It maps the flow of information and materials to maximise value to the customers on delivery and to identify those activities that do not essentially contribute value.
3. Create a continuous workflow: Establishing a continuous workflow is essential to ensure an uninterrupted flow in the creation of value and streamline the process.
4. Create a pull system: A pull system signifies that operations are dictated by demand to prevent the accumulation of redundant inventory.
5. Facilitate continuous improvement: Continuous improvement is a process that adds value while eliminating waste, relentlessly striving for enhancement.

The application of Lean management within the domain of Higher Education and Institutions proved particularly advantageous in augmenting both administrative and academic productivity (Pankajakshi R, 2012). Lean methodologies contribute to the development of sustainable enterprises (Sikora et al., 2016) and are not confined to manufacturing but are extensible to the service sector as well (Vignesh V, 2016).

The implementation of Lean principles in services can effectively reduce non-value-added activities, infuse a customer-centric culture, and refine the internal operational mechanisms. This approach justifies that a customer-centric approach is inherently a factor for deriving benefits to the customer, and on the overall deliverables (Suárez-Barraza, 2012). Despite its popularity within the service industry, the dimensions of servicescapes and change management remain noticeably absent from existing Lean frameworks; the majority of these frameworks tend to be sector-specific, resulting in a notable lack of a standardised framework applicable across various service contexts (Sharma, 2018). Andrés-López (2015) proposes a six-stage process to facilitate the application of

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Lean principles in service environments. A case study was and has developed a module incorporating Lean application tools such as Service Value Stream Management, 5S, standardization, Visual Management, Jidoka, error-proofing, Heijunka, pull systems, and Kanban. Additionally, tools aimed at sustaining Lean practices have been proposed, including Hoshin Kanri, Kaizen, PDCA, Six Sigma, and DMAIC. Bortolotti, (2012) advocates the applicability of automation in services as a remedy for improving process efficiency, reducing errors which are synonymous of wastes and enhancing customer satisfaction. Lean precedes automation in service industry.

A service industry differs from a manufacturing industry in that the outputs from a service are intangible, inseparable, variable, and perishable (Kotler, 2016), simultaneously produced and consumed and non-storable for future delivery. The heterogeneity nature of services makes it susceptible to variations in the service delivery process which cannot be easily generalized and hence activities encompassed therein cannot be easily identified and addressed for wastes, errors and standardisation. This phenomenon is particularly pronounced in professional services, whereas other categories, such as service factories, service shops, and mass services, demonstrate a reduced susceptibility to automation challenges, attributable to the specific characteristics of the service delivery process, the extent of customization, and the level of customer involvement.

The present review reveals pertinent challenges related to the adaptation of lean principles within Higher Education Institutions (HEI) and Higher Education (HE) service contexts, the eradication of inefficiencies, and the other components inherent in lean methodology and principles. The objective of this research is to delineate specific parameters that may facilitate the application of lean principles. Consequently, the study is executed as a systematic literature review employing the PRISMA framework to thoroughly explore, comprehend, and synthesize the extant of available literature.

Furthermore, the research endeavours to trace the literature in order to collect potential insights that may indicate future research initiatives, thereby expanding the conceptual boundaries of the current review.

Materials and Methods:

The present study is an attempt to explore the incorporation of lean management principles in HE. In the present premise, the study proposes to study the following research objectives.

1. To map the methodological characteristics of the studies on Lean management in HE
2. To map the application of lean management principles in HE
3. To understand the successes and limitations of applicability of lean management in HE and the reasons thereof.

In view of the above objectives, the following set of research questions are formulated to address the former.

RQ1: What are the methodology adopted in the studies on Lean Management in HE?

RQ2: What are the areas/departments where lean management principles are applied within HE?

RQ3: What are the factors of success of lean principles and the limitations of applicability within HE?

The study is an attempt to conduct a systematic literature review using a systematic method in exploring and studying available literature on the topic considered. This is done through a systematic approach to search, sort, and include studies pertinent to the theme only and eliminate studies that do not qualify the criteria set under the framework of the theme. PRISMA framework is used to perform the process in a systematic and structured manner as depicted in Fig.1 (Liberati et al., 2009; Mengist et al., 2020; Shamseer et al., 2015). In doing the same, the template provided for updated PRISMA framework is used.

The search has been conducted using Ebsco database on 24.11.2024 using the keywords “lean” AND “higher education” OR “college”, OR “University” without specifying the search field type. Altogether 29,552 results were obtained under the default settings with timeline between 1939 and 2024. Considering the pertinence and importance last ten years’ records i.e., from 2014 till 24.11.2024 were retained. As such the time line was filtered include studies after 2014 till date which yielded 19344 records. The search was then further narrowed to incorporate records in English language yielding 19182 records. Thereupon only academic journals (18567) and reviews (43) were included with the total records reducing to 18610. A preliminary random screening of the titles so obtained revealed that the records did not generally confirm to the requisite study under consideration. Hence a subsequent iteration was performed with the same keywords “lean” AND “higher education” OR “college”, OR “University” with specificity to ALLINTITLE with other fields remaining same as period: 2014-2024; and language: English which resulted in 52 records. Subsequent filtering for academic journals (28) and reviews(3) yielded in 31 records in total.

Filtering criteria	Reject	Accept
Database : Ebsco –All database		
Date of Search: November 24, 2024		
<u>Iteration 1</u>		
Search string		
“lean” AND “higher education” OR “college” OR “university”		
Boolean operators: AND and OR		
Article Selection		
Time span: 2014 till Date	10,208	19,344
Language: English	162	19,182
Source of records: Academic Journals and Reviews	550	18,160
<u>Iteration 2</u>		
Search string		
All in Title: “lean” AND “higher education” OR “college” OR “university” ; Boolean operators: AND and OR		
Article selection		
Time Span: 2014 till Date		52
Language: English	09	43
Source of records: Academic Journals and Reviews	12	31

Table 1: Search Strategy and Article Selection

The records have been exported to an excel sheet and checked for duplicate entries, wherein 4 duplicate entries were traced and eliminated. These 27 records were then subjected to a quality assessment to check for relevancy of the theme under study.

In the first level of evaluation, title examination of the 27 records were conducted to carefully assess the relevancy of the records to the present study. In doing so, 7 records were found to differ considerably in the context and the present study area and which did not sync with the research question of the present study. It has been observed that one study incorporated the term lean in the

context of body weight. Three studies were limited to the hospitals in the university. Of the remaining three studies, one dealt with food supply chain, one with development of a pavilion and the remaining one dealt with sweat analysis of American pathologists.

The remaining 20 records were subjected to a second level quality evaluation of the abstracts for including relevant studies and elimination of non-pertinent studies. On examination it was revealed that one study titled, "Lean-green manufacturing: collaborative content and language integrated learning in higher education and engineering courses" pertained to collaborative pedagogical experiments in an engineering school to study collaborative teaching-learning activities. One of the courses considered for the purpose of which one has been 'Lean-Green manufacturing'. The course by virtue of its nomenclature and as reflected in the title appeared in the search result. Another study titled, "Implementation of Lean Process and its Effects on Library Work-flow, Motivation, Behavior, and Staff Performance: a Case Study in one of the Libraries of a Research University in Malaysia" pertained specifically the incorporation of lean practices in a library as such these two records were hence dropped which finally lead the total number of records as 18.

At the third level of quality assessment has been conducted wherein each of the records were carefully scrutinised for the main text to explore and understand the content of studies conducted. On examination it has been revealed that of the 18 records under consideration full texts for 2(two) could not be obtained and 1(one) of the record pertained to an editorial published. Quality and Reliability Engineering International, 2017. The contents have been found to be generalistic in prescriptions for higher education institutions and not based on any study conducted. As such the 4(four)records has been eliminated yielding the total to 15(fifteen).

Upon a third level of full test exploration of the 15(fifteen) papers, it was found that one of the papers to be rudimentary in nature and not of much contribution to academic body. As such the same has been dropped from the list yielding the total as 14(fourteen). One article by Fowler (2021) has been found to be a descriptive article and not research article, dropping from the list and leading to 13(thirteen) in numbers. Another article By Wicker, P (2022) is a review of the book Lean semesters: How Higher Education Reproduces Inequity by Sekile M. Nzinga. As such it is dropped making the total to 12(twelve). Another article by Dempsey incorporated specific study on the lean six sigma in research grant application process, which shall entail limited implication for the purview of the present discourse. As such the same is delisted reducing the total number to 11(eleven). One study by Mcnamara and Teeling is on development of a Lean six sigma academic programme and its contribution on quality improvement projects in healthcare in Ireland. As such the study has been eliminated leaving a total of 10(ten) studies in the present discourse. One study by Morgado, Gasper & Regio conducted in Portugal is a discourse on the role of lean methodology in initiating interdisciplinarity and collaboration in higher engineering academics and is very limited to academic parlance in its context of lean applicability in the broader higher education machinery and is hence eliminated from the present discourse leading to 9(nine) studies in total.

Hence to present the data extraction, the records selected in the present study and the characteristics extracted were:

1. Articles pertained to original academic papers were considered; magazines, reports, conference proceedings, news items, book reviews were excluded.
2. The articles were directly related lean practices in academic institutions in the contributions towards the academic and administrative contexts and specific to a department as in library, hospital of the institutions have been excluded in view of the limited contribution to the perimeter of the present study.
3. The articles were in English language but not limited to geographies of countries.
4. The articles extracted were from the time frame of year 2014 till November 2024.

The retrieval process of the 9(nine) records so obtained under iteration 4 is represented in the Prisma framework.

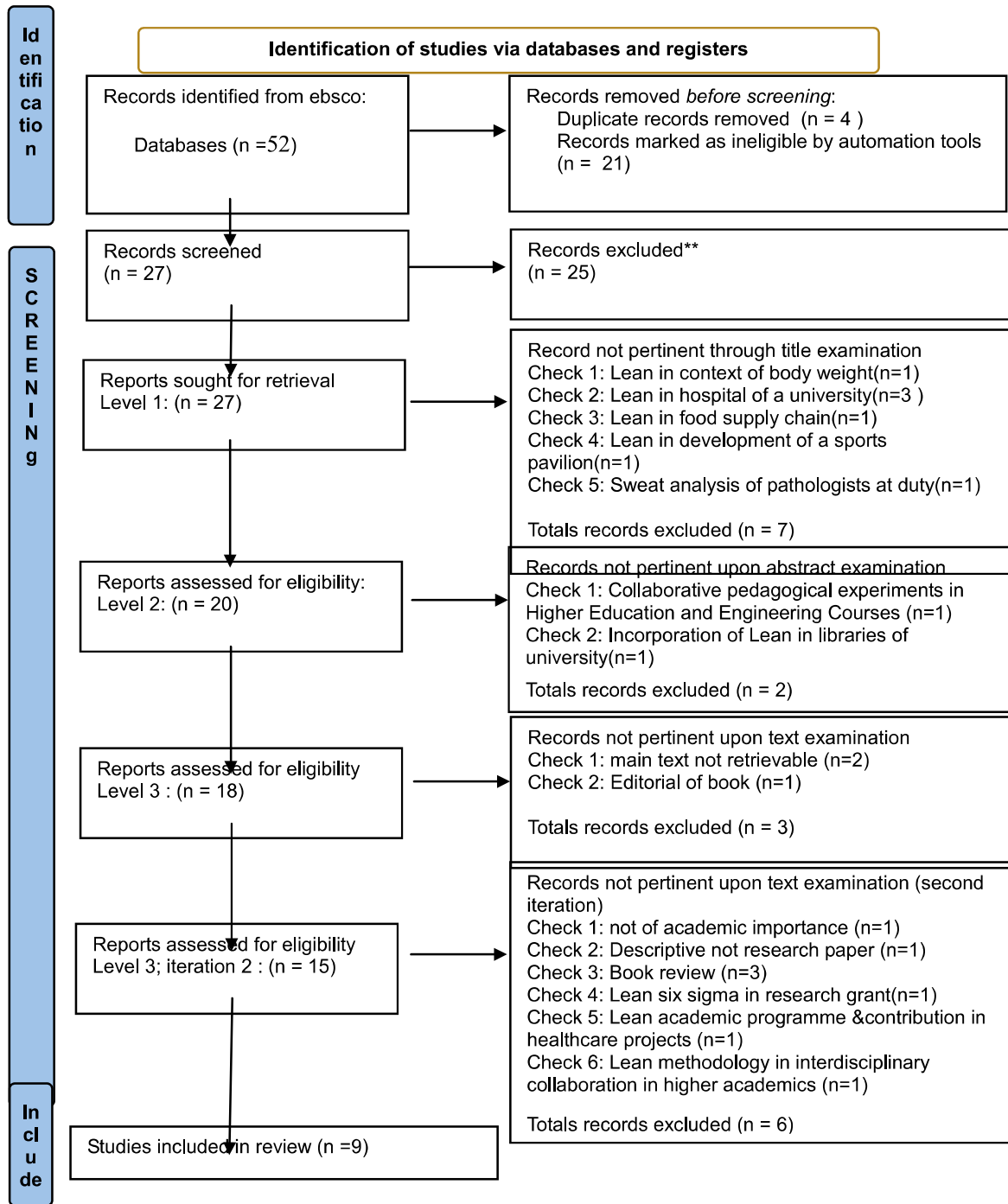


Fig 1. PRISMA Framework 2020(Shamseer et al., 2015)
Source: Researcher's self-compiled and computed data

Results & Discussion

The 9 (nine) records under consideration in the present study are bounded by the objective of lean practices in higher educational institutes. There are ubiquitous delineations to the benefits laid down by organisational improvements in academic and administrative facades. Yet there is a not much reference of a detailed and prescriptive measure of the effectiveness of the benefits of lean in HEIs. A simplified and succinct description of applicability may be a guideline for implementation of lean

which shall be robust and jargon free (Balzer et al., 2016). Klein et al., (2023) augment the findings in studies by earlier studies in that lean practices are positively correlated to the dimensions of sustainability in Higher Educational Institutions. Lean practices can aid to avalanche gains in cost reduction in workplace transactions alongside efficiency and effectiveness at work of the three dimensions the least correlated is the social dimension. The novelty in the study and its findings lead to the recommendation that lean practices at HEIs are instrumental in identifying workplace weaknesses and improvise on the parameters that facilitate the three dimensions of sustainability. Despite being bounded by the limitation in the five-point scale used and the associated possibility of thereby resulted halo effect, the study is suggestive of further studies on other factors of lean that may influence sustainability. An interrelated study of the three components of sustainability might provide indications in other angles as well. Lima et al., (2023) is both insightful and detailed and further augments the conclusive findings of Klein et al., (2023) that lean is the contributor to waste reduction and sustainability in processes. Cano et al., (2022) added a newer dimension in lean practices away from cost cutting i.e., value for stakeholders and enhance efficiency. The proposed framework provided due importance to human resources and focusses on the involvement of people for collaboration and team work. A project approach is suggestive for achieving a collaborative approach. Klein et al., (2022) substantiates positive correlations between lean and economic practices which is in sync with findings from industry. Investments in one dimension of sustainability reflects in the other two dimensions. The effects are more pronounced for an under-developed country(Brazil) compared to developed nation(Portugal) and could be owing to the more dynamic environmental condition which facilitates a bigger role of HEIs in nurturing the sustainability factors and overall country conditions. Klein et al., (2021) has presented a detailed study in organising wastes in HEIs with the seven wastes of motion, transportation, inventory, defects, overproduction, waiting and over processing along with loss of knowledge adding to the eighth place and further twenty-four sub-wastes. The study is contributory in waste prioritisation for the wastes and sub-wastes. Further studies necessitate a detailed interrelatedness of the wastes in lean design of HEIs and in the sustainability. The classification of the wastes and sub-wastes have been performed using Multi Criteria Decision Method wherein the cause-effect relationship amongst the 22 sub-wastes and the priority hence have been obtained. Interestingly, the most and least prioritised waste are found as information overflow and skill mismatch respectively. Besides, sub-waste talent is a causal factor and motion and transportation waste is an effect (Kazancoglu & Ozkan-Ozen, 2019).

Paper title & author	Publisher & Year	Purpose	Methodology	Findings	Limitations
Lean practices toward a balanced sustainability in higher education institutions: A Brazilian experience; Leander Luiz Klein, Julio Cesar Ferro De Guimarães and Eliana Andréa Severo and Eric Charles Henri Dorion and Thiago Schirmer	International Journal of Sustainability in Higher Education; Emerald Publishing Limited 2021	To analyze the relationships between lean practices and sustainable practices To provide a prescriptive for the HEIs by reducing waste and value creation in post covid period.	Quantitative & descriptive type using survey of 454 public and private HEIs workers. Confirmatory factor analysis and structural equations modelling were used for data analysis. The data was collected from a non-probabilistic sample during June - August 2020 using Snowball method through Google Forms questionnaire The questionnaire was developed to measure the causal relationships between the HEI lean practices and the triple bottom line (TBL) of sustainability viz., economic, environmental and social dimensions	HEI lean practices are positively related to environmental, economic and social practices in HEIs. Lean activities have an impact on the awareness of waste and residues, the reuse of materials, in the reduction of water and electricity consumption and the separation of organic and recyclable waste	The study does not incorporate other factors of lean practices that influence sustainable practices and the interrelatedness of the individual TBL components on lean practices. A comparison of the three concepts of TBL of sustainability can be possible.
Sustainability in Public Universities through lean evaluation and future improvement for administrative processes Eduardo de Souza Lima, Ualison R'ebula de Oliveira, M'arcio de Carvalho Costa, Vicente Aprigliano Fernandes, Pítias Teodoro	Journal of Cleaner Production, Elsevier Publication 2023	The study is conducted with the purpose of improving the sustainable impacts by the application of Lean Office in its administrative processes.	The research uses a case study at a Public University in Brazil. The work employs a methodology for identifying, analyzing and eliminating waste in administrative processes in universities based on the phases and steps recommended by the LEFI Method (Lean Evaluation and Future through incorporation of Value Stream Mapping in a quantified way, the synergy between lean principles with sustainability in the social, environmental and economic dimensions in universities.	A significant reduction in the completion times of the services provided positively influenced satisfaction of its stakeholders. In the economic dimension, Lean promoted considerable cost reductions with printing services. In the environmental context, it led to saving of over million liters of water, preservation of 67 trees and non-emission of 43.82 kg of CO2.	Being a single case study, the generalizability of findings shall be limited. The study is limited in the barriers in applicability of lean and the mechanisms to tackle. It is also indifferent to the interrelatedness of administrative processes and student learnings alongside teachers' roles. The study also is limited in the relationship and quantification of sustainability and lean in processes.
Can lean	Studies in	The paper	A case study approach	Key categories for	The study is limited

management change the managerial culture in higher education? Michele Cano, Rowena Murray & Athanassios Kourouklis	Higher Education, Taylor and Francis Group 2020	proposes to use Lean Management in Higher Education to create value for stakeholders rather than cost-cutting through a grounded theory approach	was used using interview for 15 participants, with experience of LM in HE, were recruited for interviews The grounded theory approach by Strauss and Corbin was employed to inductively generate an LM framework for HE. This was done through collecting and analysing interview data and constantly comparing and checking for repeatability and avoid bias	implementing LM in HE were identified and formed the theoretical framework presented viz., Leadership, Staff buy-in & LM in HE. The HR function should be involved in the LM implementation and promote a culture for improvement The framework brings the focus back to people, through involvement and participation, and promotes improvement through team-work, cooperation and collaboration.	in its applicability of the resolution of problems associated with managerialism in HE.
Lean management and sustainable practices in Higher Education Institutions of Brazil and Portugal: A cross- country perspective Leander Luiz Klein, Anabela Carvalho Alves, Thiago Schirmer Feltrin and Maria Florentina Abreu	Journal of Cleaner Production, Elsevier 2022	To confirm causal relationships between lean management practices and economic, environmental and social practices of HEIs the study is to explore the variation in lean practices in under developed and developed countries and the approaches to sustainable development as such	Lean management and social practices varied greatly across the countries, developed and under developed. However, the lean management practices have significant positive effects in the sustainability parameters of environment, economic, and social.	Lean management is significantly found to impact the three sustainability components including economic, social and environmental. The model proposed can be instrumental in lean management applicability and for sustainability practices.	The findings may not be generalizable owing to only two countries under consideration and the usage of a five-point scale which would probably create a halo effect in the findings.
Management of lean waste in a public higher education institution Leander Luiz Klein, Mirela Schramm Tonetto, Lucas Veiga	Journal of Cleaner Production Elsevier, 2021	To propose a lean management framework applied to waste management in public higher education institutions	The Analytical Hierarchy Process (AHP) methodology was utilized and applied in a Brazilian Higher Education Institution (HEI). The seven classical Lean manufacturing wastes plus the knowledge waste were taken to	this study proposes a waste management framework with examples to orientate managers as well as academic and service university staff about wastes. Also, the results demonstrate that loss of knowledge and	The limited sample size and the use of five point scale could lead to halo effect in the generalisations. Besides, relationship between lean and circular economy can indicate further study directions and

Avila, Rodrigo Moreira		(HEI) and to test it in the field	make a multi-criteria matrix composed of 24 wastes. The wastes were scored and categorized according to the answers of the directors and vice directors of the HEI studied. A pairwise criteria decision-making method is used, the AHP	over-processing wastes are the most relevant to be treated at the university campuses. The waste prioritization allows universities to organize their activities and select tools or practices to optimize their efforts to create value for final users.	results.
The effect of lean culture on the reduction of academic corruption by the mediating role of positive organizational politics in higher education	Fahimeh Mahmoudi, Rouhollah Bagheri Majd	Iran	The method was descriptive with correlational research design which included faculty members from two select Universities using stratified random sampling according to three groups of humanities, technical and engineering sciences and basic sciences in a sample of 185 respondents. The analysis method was using Partial Least Squares (SmartPLS).	The results showed that Lean Culture directly and indirectly was effective in reducing Academic Corruption through Positive organisational politics. Moreover, Culture had a direct effect on politics which in turn had a direct effect on Academic Corruption reduction. Lean values could possibly effect in reducing corruption; reduction of which influenced cultural and political factors of higher education.	The major limitation of the study was being carried out in a university located in the geographical area of Sistan and Baluchestan. The mere focus to the respondents of the faculty members has limited the deep view of other stakeholders in the higher education. The mere focus on quantitative research has limited the respondents' different ideas on the understanding of AC to some extent. Additionally, the basic factors in motivating and maintaining corruption in different institutions, cultures and countries are relatively less generalizable. Future research could be carried out in a wider population, considering the quality of services, information technology (IT), and professional ethics to corruption.
Lean in higher	Yigit Kazancoglu	Turkey	The study uses identification and	The results showed that the most important	Applicability of different MCDM

education A proposed model for lean transformation in a business school with MCDM application	and Yesim Deniz Ozkan-Ozen		elimination of waste to define eight wastes for HEIs and to investigate the causal relationship between them to develop a priority list. using a particular multi-criteria decision-making (MCDM) method, fuzzy decision-making trial and evaluation laboratory (DEMATEL). To achieve this semi-structured interview were conducted in two phases amongst the respondents from a Turkish University	wastes in the business school selected were repeated tasks, unnecessary bureaucracy, errors because of misunderstanding/communication problems, excessive number of academic units and creation of an excessive amount of information. Another important result was that all the sub-wastes of talent were in the causes group, while motion and transportation wastes were in the effect group.	methods can be made and other measures could be added to each sub-waste to identify such wastes. Alongside, a cross-country study shall be more comprehensive and involvement of others take holders apart from teaching staff can yield different perspectives.
The Application of Lean Management in Higher Education	Stephan Höfer and Jörg Naeve		The study uses literature review methodology. It explores five key lean principles their implementation through short case studies from the University in Germany which are thereupon compared to the findings from the literature.	The elements of customer, process, employee, and organisation can be employed using multiple tools and techniques to facilitate a lean organisation. Success in lean can be achieved through practice organisation wide.	The study does not entail applicability of scrum in lean practices. Besides it does not indicate improvisations in learnings and creativity in higher education.
A review and perspective on Lean in higher education	William K. Balzer, David E. Francis, Timothy C. Krehbiel and Nicholas Shea	USA	The study employs literature review to examine the use of Lean in higher education in 64 publications using EBSCO.	Lean is a powerful tool appears can improvise academic and administrative operations in higher education being effective at the department/unit level or throughout the entire institution. The potentiality of the same is impactful if and only if lean is administered at strategic planning level.	The study has presented cases on the improvisations lead by lean in academic and administrative parlance yet lacks in evidence-based outcomes on the effectiveness of lean.

Table 1: Details of Papers reviewed
Source: Researcher's self-compiled data

A Five -step plan is suggested as a roadmap for HEI for implementation of Lean in priority order of top management commitment, analysis of cause-effect relationship of wastes, categorisation of the consequences of the eight wastes, current state analysis for adoption of lean and a central unit of

obtaining an interdisciplinary structure. However, the findings lack in robustness in generalisability of the findings. There is also a human resource perspective to assimilation of lean in HE. Lean is instrumental in handling politics in academia through positive interventions (Fahimeh Mahmoudi, 2021). The study is suggestive of change interventions to shield individuals from organisational politics rather than annihilation of politics, which is a near impossibility. Robust disclosure systems, process sand standardization of norms can induce a positive work culture and empower the fraternity for positivity at work place. The studies in the present discourse collectively refer to the direction that HEIs are driven by tremendous pressure to sustain the global competitive markets, undersubscription of academic programmes and over promises to the stakeholders are a few of those. Striving for the rampant challenges, HEIs are expected to be a conglomerate of excellence in ten skillsets including teaching, online learning, R&D, research fundings, alumni affairs, etc. Cases in HEIs have explicated the applicability of lean principles in many a facet. This is exemplified through customer value and requirements as in lean design of a theses, value stream thinking as in purchase processes in administration, flow principle as in quick response time in communications, pull principle as in appropriate session designs and kaizen through dual and conjoined academic programmes. Notwithstanding the inherent challenges, a lean HEI can be achieved, though not prescriptive but tailor made, through a meticulous customer and value analysis followed by a detailed process flow design, enabling and empowering employees, adaptation of HEI to changes and challenges. The same is bounded by the umbrella of waste continuity in identification and elimination of Non-valued added activities (Höfer & Naeve, 2017).

A prescriptive guideline for all HEIs may not be ubiquitous. However, a tailor-made adaptation shall be required. Though this might be an onerous exercise yet identification of the wastes and sub-wastes and a proper mapping of the activities in the HEIs shall streamline the exercise for a customer driven representation of the HEI and hence aid in eliminating or at least reducing waste, thereby striving towards a lean process. The present discourse has covered studies of varied types including literature reviews and case studies. Cases have been both specific of single and multiple institutions along with single and multiple departments. Lean in HEIs have been invariably applied across academia and administrative departments as such non-value-added activities have been attempted to explore institution-wide and not limited to specified to academia or administration. As such an umbrella applicability of lean has been pertinent in the studies. The success factors are manifold, though not generalizable. Identification of waste is the most primary of all alongside a detailed process mapping. A generalised guideline with avenues for adaptations may be one of the future directions of the present study. A suitable guideline for current process mapping of HEIs can aid to identification of Nonvalue added activities being another course for further studies.

The study can be widened by incorporation of multiple databases along with Ebsco which shall enhance the number of records and might add to more perspectives on the discourses present herein. In addition, a case study conducted concurrently in any HEI in the vicinity could have added to a mixed research study to augment and add to the study and its findings. Further studied in similar lines can enhance the applicability of the study.

References:

- Andrés-López, E. G.-R.-L. (2015). *Lean service: Reassessment of lean manufacturing for service activities. Procedia Engineering, 132*, 23–30. <https://doi.org/10.1016/j.proeng.2015.12.463>
- Balzer, W. K., Francis, D. E., Krehbiel, T. C., & Shea, N. (2016). *A review and perspective on Lean in higher education. Quality Assurance in Education, 24*(4), 442–462. <https://doi.org/10.1108/QAE-03-2015-0011>
- Bortolotti, T. (2012). *"Lean first, then automate": A framework for process improvement in pure service companies: A case study. Production Planning & Control, 23*(7), 513–522. <https://doi.org/10.1080/09537287.2011.640040>
- Cano, M., Murray, R., & Kourouklis, A. (2022). *Can lean management change the managerial culture in higher education? Studies in Higher Education, 47*(4), 915–927. <https://doi.org/10.1080/03075079.2020.1817892>
- Höfer, S., & Naeve, J. (2017). *The application of lean management in higher education. International Journal of Contemporary Management, 16*(4), 63–80. <https://doi.org/10.4467/24498939IJCM.17.038.8261>

- Kazancoglu, Y., & Ozkan-Ozen, Y. D. (2019). Lean in higher education: A proposed model for lean transformation in a business school with MCDM application. *Quality Assurance in Education*, 27(1), 82–102. <https://doi.org/10.1108/QAE-12-2016-0089>
- Klein, L. L., Alves, A. C., Abreu, M. F., & Feltrin, T. S. (2022). Lean management and sustainable practices in higher education institutions of Brazil and Portugal: A cross country perspective. *Journal of Cleaner Production*, 342, Article 130868. <https://doi.org/10.1016/j.jclepro.2022.130868>
- Klein, L. L., De Guimarães, J. C. F., Severo, E. A., Dorion, E. C. H., & Schirmer Feltrin, T. (2023). Lean practices toward a balanced sustainability in higher education institutions: A Brazilian experience. *International Journal of Sustainability in Higher Education*, 24(2), 259–278. <https://doi.org/10.1108/IJSHE-10-2020-0406>
- Klein, L. L., Tonetto, M. S., Avila, L. V., & Moreira, R. (2021). Management of lean waste in a public higher education institution. *Journal of Cleaner Production*, 286, Article 125386. <https://doi.org/10.1016/j.jclepro.2020.125386>
- Kotler, P. (2016). *Marketing management (15th ed.)*. Pearson Education India.
- Lima, E. de S., de Oliveira, U. R., Costa, M. de C., Fernandes, V. A., & Teodoro, P. (2023). Sustainability in public universities through lean evaluation and future improvement for administrative processes. *Journal of Cleaner Production*, 382, Article 135318. <https://doi.org/10.1016/j.jclepro.2022.135318>
- Marcin Sikora, Maciej Kwiatkowski, Hanna Prosól, Daria Nowicka, Karolina Lorenc, & Laurena Pham. (2016). Lean management as an instrument of sustainable development of enterprises. *Management Systems in Production Engineering*. Advance online publication. <https://doi.org/10.2478/MSPE-05-01-2016>
- Pankajakshi R., & Arundathi S. V. (2012). Lean management: It's applicability in educational institutions. *Adarsh Journal of Management Research*, 5(2), 16. <https://doi.org/10.21095/AJMR/2012/V5/I2/88342>
- Shamseer, L., Moher, D., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M., Shekelle, P., Stewart, L. A., Altman, D. G., Booth, A., Chan, A. W., Chang, S., Clifford, T., Dickersin, K., Egger, M., Gøtzsche, P. C., Grimshaw, J. M., Groves, T., Helfand, M., ... Whitlock, E. (2015). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: Elaboration and explanation. *BMJ*, 349, Article g7647. <https://doi.org/10.1136/bmj.g7647>
- Sharma, S. G. (2018). Empirical analysis of existing lean service frameworks in a developing economy. *International Journal of Lean Six Sigma*, 9(4), 482–505. <https://doi.org/10.1108/IJLSS-03-2016-0013>
- Suárez-Barraza, M. F., & Ramis-Pujol, J. (2012). Lean service: A literature analysis and classification. *Total Quality Management & Business Excellence*, 23(3-4), 359–380. <https://doi.org/10.1080/14783363.2011.637777>
- Vignesh, V., & Magesh, S. (2016). Lean in service industries: A literature review. *IOP Conference Series: Materials Science and Engineering*, 149(1), Article 012008. <https://doi.org/10.1088/1757-899X/149/1/012008>